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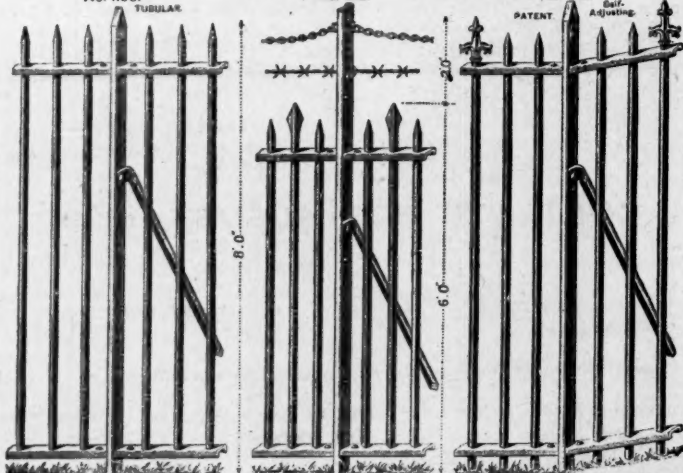
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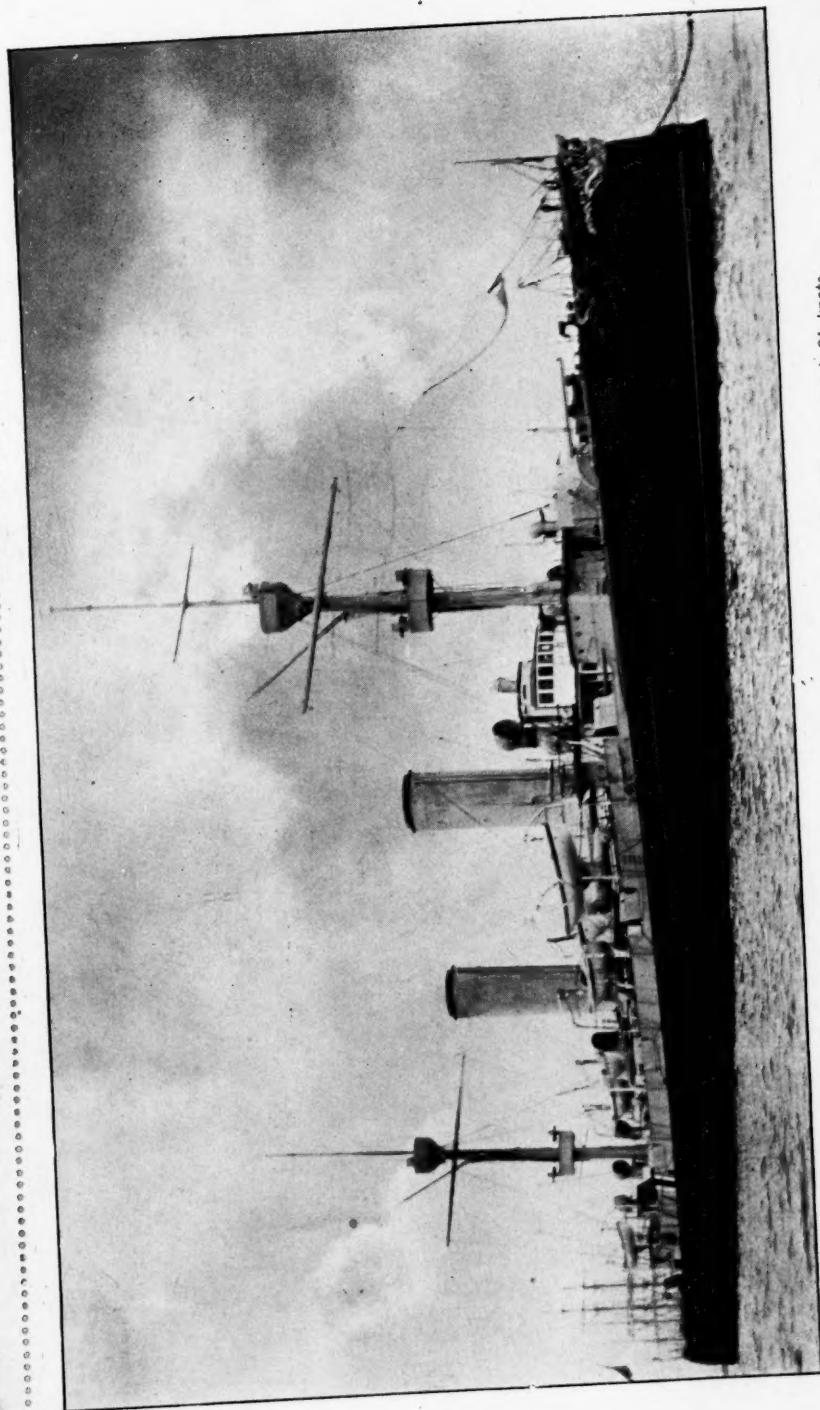
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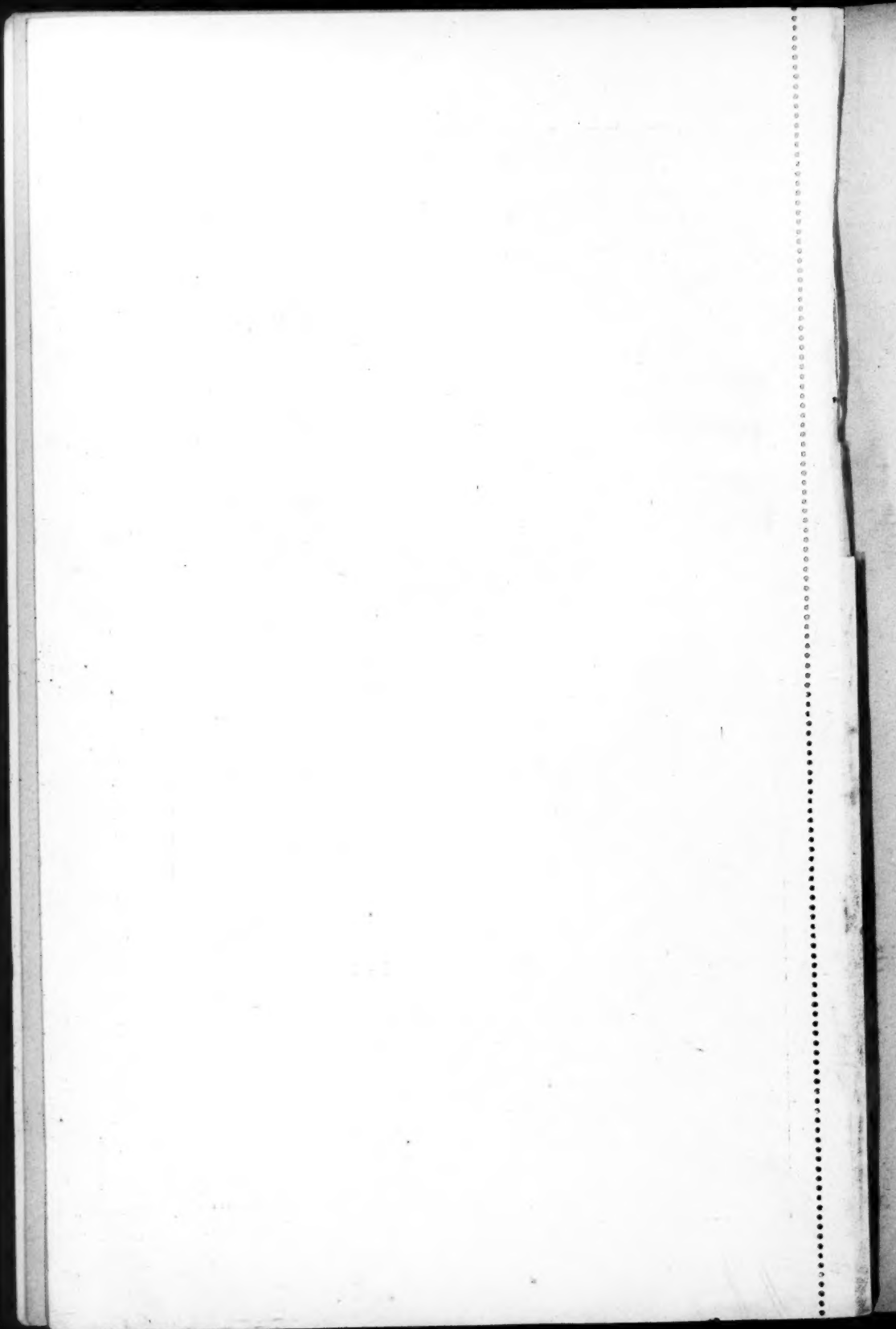
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New Chinese Cruiser "HAI TIEN." Displacement, 4,300 tons; 17,000 I.H.P.; speed, 24 knots. ARMAMENT:—Two 8-inch, ten 4.7-inch, twelve 3-pounders, all Q.F.; five torpedo-discharges; 5 to 3-inch armoured deck and 6-inch armoured conning-tower.

See Naval Notes.



# THE JOURNAL OF THE ROYAL UNITED SERVICE INSTITUTION.

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## THE DESCENDANTS OF THE KING'S GERMAN LEGION, 1803-1816.

ON the 24th January, 1899, His Majesty The German Emperor issued the following order to the Xth (Hanoverian) Army Corps :—

"When my Grandfather, now at rest with God, drew his sword in 1870 to ward off a hostile attack, Hanover's warlike sons stood true to their new King and to their German Fatherland. On bloody battle-fields they showed the old Hanoverian bravery; on the undying tables of honour of the past they wrote the new names of Spicheren, Metz, Beaune la Rolande, and Le Mans. They proved that they were worthy of their ancestors, the victors of Krefeld, Minden, and Waterloo, and the brave warriors in the Spanish Peninsula.

"I have resolved to revive those memories, which are so dear to them and to the whole province of Hanover, and which, with the disbandment of the Hanoverian Army, lost the homes where they were chiefly cherished. Henceforward, the Prussian troops which received the old Hanoverian warriors into their ranks will be the bearers of the traditions of the former Hanoverian regiments and will wear their honorary distinctions. I desire thereby to give the warriors of 1870-71 a new proof of my Royal thanks, as well as to mark my appreciation of the especially distinguished services which have in all times won an honourable name for the Hanoverian soldier. At the same time, I cherish the hope that now all who formerly belonged to the Hanoverian Army will find again the home which they have so long been deprived of, in which, among their younger comrades, they can revive the proud memories of their ancestors."

There then follows a list of the present Prussian regiments, etc., bearing the title of "Hanoverian" and recruited from the province, each of which is affiliated with one or more of the old Hanoverian regiments, and these are directed to wear on the head-dress a scroll with the battle-honours formerly worn, and to consider the date of formation of the old regiments as their own. It need scarcely be said that there is no direct connection between the old regiments and the present ones, which were formed in 1866 from companies, squadrons, and batteries detached from existing Prussian regiments, but in the selection regard has been had to the garrison occupied, the recruiting district, and other institutions which the old and the new formations had or have in common, as well as to the regiments in which the former Hanoverian soldiers served in the war of 1870-71.

His Majesty's gracious act has been received with deep thankfulness and enthusiasm, not only by the members of the old Army and by the people of the province generally, but by the new regiments which have inherited the old traditions. All these latter have issued advertisements asking all former members of the old regiments to which they are affiliated to send their names so that arrangements may be made for the cultivation of comrade-like relations, and these summonses have been responded to with enthusiasm. The thankfulness of the former officers expressed itself in a present from them to the Emperor of a beautiful silver model of the Waterloo column at Hanover on a pedestal of black marble, the whole over 6 feet high, which was handed over to His Majesty on board the "Hohenzollern" on the 18th June, the 84th anniversary of the Battle of Waterloo. The subscribers were confined to such former officers as had, after the disbandment of the Hanoverian Army, entered the Prussian Service. There were originally 456 such, of whom 21 are still on the active list, and of 250 who are known to be still alive, 234 joined in the subscription. For various reasons, 11 other former officers, who had not transferred their services to the Prussian Army, were permitted to join in the gift. To the address which accompanied the presentation His Majesty made a suitable reply, in which he said that his expectations had been exceeded and his hopes fulfilled in a much larger measure than he had expected, and that from all the Hanoverian garrisons he had received reports stating how well his intentions had been understood, and how quickly the old traditions had been revived and friendships had been formed between the old soldiers and those of the present day. At the subsequent lunch to the deputation of old officers who made the presentation, the Emperor gave the toast:—"Together with the Hanoverian regiments, which to-day by my order are celebrating this anniversary in their garrisons, and with my English Dragoons, I empty my glass to the memory of the old Hanoverian Army and the future of the present Hanoverian regiments. Hurrah! Hurrah! Hurrah!"

Under those interesting circumstances it is desirable for us to know by what regiments of the present Prussian Army our distinguished companions-in-arms of the Peninsula and Waterloo, the King's German Legion, the memory of which is still green amongst us, are now represented, and with this view the table at the end of this article has been drawn up from authentic records. It will be seen that only 1 regiment of infantry, 1 battalion of rifles, 4 regiments of cavalry, 1 regiment of artillery, and 1 battalion of pioneers, can claim descent from the renowned corps of the Legion, the other Hanoverian regiments being descended from new formations raised in Hanover (most of which fought alongside us at Waterloo) in 1813-14.

For the better comprehension of the table, the following notes on the old Hanoverian Army are added:—

In 1816, out of the infantry of the King's German Legion and the Hanoverian new formations, there were formed 10 regiments of infantry, Nos. 1 to 10, each bearing the name of a district and composed of 1



Regular battalion (which had a special name of its own) and 3 Landwehr battalions named after the sub-districts from which they were recruited and existing only as cadres. In 1820, the Landwehr cadres were abolished and the infantry formed into the Guard Rifle Regiment, the Guard Grenadier Regiment, and 10 Line regiments (1st to 10th), each of 2 battalions of 4 companies. In 1833, an organisation by single battalions was adopted, the battalions being named Guard Rifles, Guard Grenadiers, 1st and 2nd Light, and 1st to 12th Line Battalions, each of 5 companies. In 1837, on the separation of Hanover from the British Crown, the red uniforms of the Grenadiers and Line were changed to blue. In 1838, a 3rd Light Battalion was formed and the Grenadiers and Line organised in 8 regiments (Guard and 1st to 7th) each of 2 battalions of 4 companies. With the exception of the change of name of the "Light" to "Rifle" battalions in 1857, this organisation was maintained till the disbandment of the Army in 1866.

The cavalry also underwent numerous changes of organisation. In 1816 there were formed 2 cuirassier (Guard and Royal), 4 hussar (1st to 4th), and 2 lancer (1st and 2nd) regiments, each of 4 squadrons. Slight changes of name, only took place in 1820 and 1829. In 1833 the hussars and lancers were transformed into dragoons and the regiments were linked in pairs bearing the same name, the regiments being lettered "A" and "B" in each pair, and each being composed of 3 squadrons. This organisation only held till 1838 when the cavalry was formed into 2 cuirassier, 4 dragoon (1st to 4th), and 2 hussar regiments, independent of each other and each counting 3 squadrons. In 1849 the 1st and 2nd Dragoons were broken up, the 3rd and 4th dropped their numbers, and all regiments were raised to 4 squadrons.

The artillery underwent fewer changes than the other arms. The Legion had 2 horse and 4 foot (field) batteries, and these with 2 Hanoverian foot batteries formed in 1816 the Corps of Artillery of 2 horse batteries and 10 foot companies. The horse batteries existed as a brigade-division, with their garrison at Wunstorf, down to 1866, and it is interesting to note, in these days of search after a smart head-dress, that the old helmet with a bearskin crest of the Waterloo days was restored to them in 1862, and in it they fought at Langensalza. The foot companies were formed into 2 battalions, 1 of 4 and 1 of 3 companies, and a company of artificers in 1833. In 1838 the title of the corps was changed to "Artillery Brigade," and in 1859 the foot companies were re-organised into 3 battalions, each of 3 foot companies and 1 park company, besides a company of artificers. The 1st and 2nd Battalions were stationed at Hanover, the 3rd at Stade. They are now represented by the Von Clausewitz (1st Hanoverian) Field Artillery Regiment, No. 10, stationed at Hanover, which bears the honours "Peninsula," "Waterloo," "Göhrde."

The Legion had only a staff of engineer officers, no men, and this organisation was retained till 1833, when 2 pioneer companies were formed and stationed at Hanover. They are now represented by the 10th (Hanoverian) Pioneer Battalion at Minden, which bears the honours "Peninsula," "Waterloo."

*Table showing present Inheritors of Honours of the*

Former units of The King's German Legion.	Became in			
	1816.	1820.	1833.	1838.
1st Light Battalion	Guard Rifle Bn. (1st Regt.)	1st Bn. Guard Rifle Regt.	Guard Rifle Bn.	Guard Rifle Bn.
2nd " "				
3rd Line Battalion	2nd Guard Bn. (3rd Regt.)	2nd Bn. Guard Rifle Regt.	2nd Light Bn. (with 2 com- panies from other regts.)	2nd Light (1857, Rifle) Bn.
4th " "				
1st " "	Guard Grena- dier Bn. (2nd Regt.)	1st Bn. Guard Grenadier Regt.	Guard Gren- adier Bn.	Guard Regt. (together with 3 com- panies from other bns.
2nd " "				
5th " "	3rd Guard Bn. (4th Regt.)	2nd Bn. Guard Grenadier Regt.		
8th " "				
6th " "	Landwehr Bns. " Emden," " Leer," and " Aurich " (10th Regt.)	Disbanded	—	—
7th " "				
1st Dragoons	Guard Cuiras- siers	1st Guard Cuirassiers (1829, Life Guards)	Life Guards, A.	Life Guards ...
2nd " "	Royal Cuiras- siers	2nd Royal Cuirassiers (1829, 1st Royal Cui- rassiers)	Life Guards, B.	Guard Cuiras- siers
1st Hussars ...	Guard Hussars	1st Guard Hus- sars (1829, Guard Hus- sars)	King's Dra- goons, A.	Guard Hussars
2nd " "	2nd (Osna- brück) Hussars	2nd (Osna- brück) Hussars (1829, 2nd Queen's Hussars)	Queen's Dra- goons, A.	Queen's Hus- sars
3rd " "	3rd (Göttingen) Hussars	3rd (Göttingen) Hussars	Duke of Cam- bridge's Dragoons, A.	3rd Duke of Cambridge's Dragoons (Dropped num- ber, 1849)

*Infantry and Cavalry, King's German Legion.*

Garrison in 1866.	Present Representative in the Prussian Army.	Garrison and Army Corps.	Nominal date of Formation and Honours borne on the head-dress.
Hanover ...	10th Rifle Bn. (Hanoverian)	Colmar (XIV. A.C.)	{ 19th December, 1803, "Peninsula," "Water- loo," "Venta del Pozo."
Hildesheim ...			
Hanover ...	73rd Fusiliers (Hanoverian)	Hanover (X. A.C.)	{ 19th December, 1803, "Peninsula," Water- loo."
—	—	—	—
Hanover (H.Q.)	13th King's Lancers (1st Hanoverian)	Hanover (X. A.C.)	19th December, 1803, "Peninsula," "Water- loo," "Garzia Her- nandez."
Nordheim (H.Q.)	14th Lancers (2nd Hanoverian)	St. Avold (XVI. A.C.)	10th December, 1805, "Peninsula," "Water- loo," "Garzia Her- nandez."
Verden (H.Q.) ...	15th Hussars (Hanoverian)	Wansbek (IX. A.C.)	{ 19th December, 1803, "Peninsula," "Water- loo," "El Bodon," "Barossa."
Luneburg (H.Q.)			
Celle (H.Q.) ...	9th Dragoons (Hanoverian)	Metz (XVI. A.C.)	25th November, 1805, "Peninsula," "Water- loo," "Göhrde."

## ARTILLERY IN CONJUNCTION WITH A FORCE AWAITING ATTACK.

*By Major E. S. MAY, Commanding "T" Battery, R.H.A.*

Monday, February 13th, 1899.

General the Rt. Hon. Sir REDVERS H. BULLER, V.C., G.C.B., K.C.M.G.  
(Commanding the Aldershot District), in the Chair.

WHEN, at the very flattering invitation of this Institution, I promised the other day to give a lecture on an Artillery subject, and was left to choose that subject for myself, it was with no small misgivings that I selected that on which I am about to dwell. But we have heard so much of late as to the armament of artillery, as to its organisation, as to its experiences on service, as to its handling in attack, that it seemed only left to me to discuss some features of its employment when circumstances call forth its main energies to ward off, rather than deliver, the great decisive blows of the day. Into the controversy which has always raged, and is still raging, as to whether the improvements in firearms have most favoured attack or defence, I have no idea of entering. It is quite possible to pile argument on argument, so far as mere theory is concerned, in favour of either view of the case, and examples from military history can be marshalled in deep battalions to support them. Since the war of 1870, the successes of the Turks behind their entrenchments in the last Russo-Turkish war, and the universal strides in the manufacture of warlike *matériel*, have caused many to favour tactics which enable them most fully to utilise cover, while the difficulty even a well-directed fire of shrapnel found in reaching the tribesmen in their strongholds during the late Tirah campaign has given additional weight to their views. Finally, the terrible destruction inflicted on the Dervishes at Omdurman must have made many doubt whether it will ever again be possible to take a position in the open when held by troops well trained, well armed, and well led. The Drill-Book says that a superiority of three to one without artillery may do it; but, after reading of the effect of the long-range fire at Omdurman, we may well doubt whether four to one, five to one, or six to one will turn the scale under such circumstances.

On the other hand, we must remember that those not fired upon themselves shoot in a very different fashion than they may be expected to when suffering losses. It is also well, when we draw conclusions from Plevna, to remember that the Russian artillery tactics were then



contemptible, and that at the Aladja Dagh shelter-trenches and modern rifles were no match for well-directed shrapnel. But at that last battle the great result was achieved by artillery in attack. The splendid success of the German batteries in 1870 was also gained in that rôle, and, further away still, the most memorable triumphs of Napoleon recall vast masses of guns flinging their concentrated weight on a selected spot, and making a breach for the columns of assault. Much of the teaching as regards artillery has accordingly been devoted to guns with an attacking force; there is more fascination about such a rôle, more scope, it may appear, for enterprise, more room for originality. It is time, surely, to give some attention to another side of tactics, and to study what was accomplished by batteries awaiting an attack in position, as, for example, on several occasions during the American war. At Malvern Hill half the casualties on the Confederate side were due to the fearful destruction scattered round by the Federal guns. It was an effect unprecedented, I think, up to that time, when round-shot and smooth-bores were not yet obsolete, and modern science had only just begun to affect gun-construction.

In any case, defensive tactics must ever have a special interest for us, because we have so frequently benefited by them in the past, and shall probably rely largely upon them in the future. Inferiority in numbers often demands the support defensive positions may yield, and we can scarcely hope to fight with the big battalions on our side. For home defence, moreover, where we may find adequate numbers of infantry, it would seem that the support of an efficient field artillery will be lacking, and later on, when I come to define the duties which will fall to batteries, it will be seen how serious such a deficiency may prove.

Again, even if all artillery officers are quite familiar with the various considerations which govern the handling of guns on the defensive, I doubt if all officers of other arms are so well versed in the subject that what I have to say will appear trite and worn threadbare. Yet all officers should completely understand artillery, and assume its direction with confidence. Properly speaking, there are no artillery tactics, nor, for the matter of that, infantry tactics either. We should only know combined tactics—the rest is drill. In the case of artillery, bullets are fired from big tubes many at a time, and they have an extended range; in the case of infantry, they have a less range, and they fly singly. But both arms utilise the power of fire, and fire is the determining factor in warfare. If the guns of one side are silenced, it simply means that that side cannot shoot at certain ranges. This disadvantage concerns the force as a whole, not one portion of it; but, if anything, it concerns infantry more than artillery, because by far the largest portion of all forces is composed of that arm, and the guns are merely the adjuncts and tools utilised in the interests of the infantry to enable it to gain the victory. An arm which prides itself merely on technical knowledge and skill, and, because of its supposed technicalities, is not confidently handled by an officer alien to its ranks, will always be imperfectly understood, may even itself become prone to find excuses, and create impossibilities. I have

thought, therefore, of addressing myself largely to officers of the other arms, and sincerely trust we may subsequently hear some opinions from them.

I may add also that in choosing a title to this lecture I have been careful to avoid the use of the term "defensive." I did that, perhaps, more in the interest of the Force as a whole than in that of the guns. An army may have to take up a position, may strengthen it by entrenchments, and deliberately stand to await an attack. The French did this, for example, at Gravelotte. Again, a force may know that it must hold out in a certain place for a certain time with a special object in view, as Wellington stood waiting for the coming of the Prussians at Waterloo. But even in such cases a purely passive attitude should not be the only one contemplated, and still less should an army, coming into collision with another army when both are in movement, even if forced to adopt a defensive rôle (as one or other in the nature of things is bound to be), let go the determination to turn the tables when opportunity offers. It might be supposed that artillery, being an arm which can only produce an effect while at rest, and which, to gain the best results, should remain considerable periods in position, would exhibit its highest powers in an attitude of passive defence. It would be a fatal mistake to let that notion get about. Entrenchments and heavy cannon may prove but an illusory security, and the guns must be able to move with the infantry. Certain positions have been surveyed and studied, and a general in the course of hostilities may manœuvre to occupy them, and if occupied they should be strengthened and fortified, as time permitted. Nevertheless, I trust not a sod will ever be cut, not a spadeful of earth removed, until the circumstances of the moment call for such steps. Otherwise, we may have an inert occupation of localities, a helpless clinging to earthworks, in place of a vigorous attitude of preparation, which signifies that if we wait for our enemy it is only the better to spring upon him when the time comes. Our Volunteers, should they ever have to defend our homes, will, I regret to say, have to rely for support largely on batteries which will scarcely exhibit proficiency as regards mobility; let us trust they will not imagine that a war of positions is all that they are ever to aspire to. The guns of a force on the defensive should be as prepared to move as those which they oppose, and troops unequal to undertaking the offensive when occasion offers will in the long run fall a prey to their antagonists. It is, among other reasons, to remove any misconceptions such as these that I have chosen the subject before us to-day.

We are already well acquainted with the duties of the artillery of the attack, but they may be summed up broadly by saying that to prepare the way for the final assault of the infantry is their most important feature. The enemy is in position in front of it, its target is never a doubtful one, and its whole energies are concentrated on one object alone. The main thing is to get the guns up in good time, and in the later stages of the battle to concentrate their fire on the decisive point.

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Far more difficult and complex are the considerations which now govern the handling of guns which await an onset. Let me draw attention to a few.

Concealment of the force of which they form part and of its disposition is a matter of much moment; and many a doubt as to when they should open fire must vex the souls of battery commanders. Likewise, is a well-concealed position a primary object in these days of smokeless powder, and many a well-proved expedient will no longer hold good. Formerly guns were often not seen until they opened fire. It is now next to impossible to see them even after they have done so, if there be bright sunshine, and if the background be not dark. Formerly a dark pine-wood behind a battery was a distinct advantage, now it is just the reverse, and the bright flashes of the guns against it reveal their presence.

Again, the problem of whether brigade divisions may be broken up or not appears to many to offer difficulty. We have so much insisted in these last few years on the importance of holding that unit together, that the views of even artillery officers have occasionally grown stereotyped concerning it. In the attack, where the object in view is a concentrated effect, you would very rarely divide the three batteries. But when you await attack you usually have in view the object of delaying the enemy as long as possible. Time may send you help, or the attack may develop so slowly that nightfall may bring it to a standstill. Hence you may desire to deceive your opponent as to your strength, and you will certainly want to command all the avenues by which he may advance upon you. Your flanks will rarely or never both rest on natural features, such as will guarantee their security, and a weak flank or flanks must be strengthened by batteries. As I shall presently explain, there are other places also where guns may be needed, but I have, I think, already said enough to show how much an artillery leader with a force awaiting attack may be compelled to disseminate his force, and yet all the time will be planning in his own mind how to keep his fire controlled and directed as much as possible by one will, and how he may oppose the inevitable masses of the attack with similar masses of guns.

My personal experience has taught me that it is not superfluous to dwell on simple points such as these, although many officers completely understand them. I know that a general last summer said, "I never attempt to do it (that is to say, break up a brigade division) but I find that my artillery commander raises the strongest possible objections!" Again, I have seen a rear-guard action to gain time undertaken by a division. There were three roads leading right on to the first position it took up. A battery of its brigade division was told off to command each of the roads, which were so far apart that they could not be seen from one and the same place. Before a subsequent position was reached the three roads had merged into two, and one battery was placed to command one road while two looked after the other. In consequence, the columns of the attack had in both cases to make early deployments and drive the several batteries away, before the

roads could be utilised. The long-range fire of guns had effected its object, the onward march of the attack was much delayed, and the rear-guard fulfilled its mission. But I remember that the gunner was blamed because he had broken up his brigade division, as though such action were a species of sacrilege never to be contemplated but with horror, and never to be forgiven. It is little experiences such as these that make me feel that I am not flogging a dead horse when I criticise such views.

The breaking up of a *battery*, whether on the defence or not, is, however, a totally different affair, and except under abnormal conditions is never to be thought of, because it absolutely destroys the whole system of training and fire discipline on which the efficiency of our artillery rests. I am quite sure it is not unnecessary to dwell on this minor instance of disseminating guns, for in even the latest tactical works examples involving the breaking up of batteries are to be found, and indeed the addition of two or three guns to a force appears to be quite a favourite arrangement.

With these words of preface, I may proceed to discuss more closely the immediate duties of the batteries which await attack. These are usually described as falling within two categories, the "preparatory," and the "main" action. But this preparatory action is not to be confused with that which would very often be confined to the horse artillery batteries with the cavalry, and to those of the corps artillery pushed forward under the protection of squadrons most usually on the flanks with a view to temporarily delaying the enemy's advance, forcing him to disclose his intentions, and preventing him from reconnoitring the dispositions of the defence. It being especially desirable that the manner in which the position is to be occupied should be kept from the enemy as long as possible, it is not advisable to place guns in position during this early stage, although they should be under cover close at hand, ready to come up. Meanwhile the ranges to such places as the hostile guns must occupy are taken. It is almost certain that the guns of the attack when they are deployed will be in superior force, and therefore they should be engaged as they appear, and taken as far as possible in detail. It is also a great object to force an early deployment of the hostile guns, for every time that batteries move they lay themselves open to loss, while if they do not move they cannot support their infantry as they should do.

The defence, therefore, strives to prevent the guns of the attack being at once brought into action at ranges where their effect will probably be considerable; and meanwhile endeavours to show as little as possible of its hand.

The struggle between the two artilleries must, however, sooner or later take place, and it is this which forms the chief part of what is known as the "preparatory" action. In it the advantage of choosing where the main issue is to be fought out, and the power to bring the weight of all its force to bear there, lies with the attack, while on the other side the guns should be better placed, ranges should be known, and but little exposure of men and horses need be incurred.

But before discussing sundry points in connection with this phase, it is well to say something as to guns in front of the main position.

Where the ground is open in front of a position, and the advance of the enemy is exposed, advanced posts, even if only to be held by infantry, are not desirable, and they should not be occupied unless they are flanked, and retreat therefrom is covered, by effective artillery or infantry fire from the main position. But, if we may never have to fight in regions such as Great Britain or Ireland, where the country is usually a good deal wooded and enclosed, we shall frequently have to grapple with the difficulties of such ground at manoeuvres. Now, at home the country is such that it is often impossible to get a fair field of view, and in these cases when some feature of the ground hides the space in front of it from the main position, or if it be such that it offers a point of vantage to the enemy, it may be judicious to hold it strongly, and place guns there, provided always that it possesses a good line of retreat.

Again, an advanced post or position in front of a flank may be of much importance, and a comparatively strong force may be detached to hold it tenaciously. Here the support of guns might sometimes be required, and they might occasionally be so placed as to threaten to enfilade the first line of the hostile attack. Their fire would also draw that of the enemy without exposing the situation of the guns in the main position unnecessarily early. Such a post or position would also embarrass the enemy should he attempt any turning movement, because to avoid fire from it he would have to move on a wide arc. It is sometimes said that such posts in front of the centre are useful in facilitating the preparation and issue of counter-attacks, but a post such as I have described would seem a favourable one from which to cover such enterprises, and one flank of the force making the counter-stroke would be protected by it.

Coming to the distribution of guns in the main position, and the choice of sites for them, it is not superfluous to urge that if guns are to fully utilise their range, all ideas such as formerly in the days of smooth-bores held sway as to keeping batteries with the units to which they belong, must be abandoned. They must often be handed over to the will of the supreme authority, to be used for the benefit of the whole force, and not for that of any particular part of it. "Position is the chief factor in the use of artillery, and its importance increases in compound ratio with the range, accuracy, and power of the arm," as General Tidball, of the United States Army, has well pointed out; the best positions must be allotted to the guns, and they must be placed in them in just such numbers and combinations as circumstances, not organisation, demand. During the impending artillery duel the batteries play a principal part, and at first, therefore, the dispositions of the infantry must be subordinated to their interests.

It is not, however, until the intention of the enemy to attack is unmistakable that troops need be placed actually on the position, but while they remain under cover preparations in the shape of entrenchments may be made for them. I should say a word, perhaps, as to the value such defences possess for artillery.

Artificial cover does not give a great deal of protection from

shrapnel bullets to gunners, owing to the angle of descent of the bullets, and the fact that men working a gun cannot stand quite close up to a breastwork. But it does give a certain amount, and when the ground is favourable may be resorted to. I must point out, however, that while it is not often that it can be utilised in the case of artillery now, it will be still less often that it will be of assistance in the future. For this reason: If you cut away the top surface of the ground, as you do when you make gun-pits, the gun is fired on a substratum of freshly uncovered earth, and this is almost always damp and soft. For drill purposes or at manœuvres this does not seem to matter much, the gun is well screened, and the arrangement works admirably. But when service charges and projectiles are in the bore, very awkward results soon supervene. The vastly increased recoil drives the wheels deeper and deeper into the soil, until they may perhaps sink so much relatively to the point of the trail that the gun cannot be laid or fought; or the rigidity with which the recoil is arrested may be such that rivets, spokes, and plates begin to show signs of giving way. Then with difficulty the piece has to be dragged from its place, horses have to be called up to move it, fire is brought to a standstill, and heavy loss is risked. With quick-firing guns these difficulties are all vastly accentuated, for even on moderately hard ground the spades below the gun, on which in one form or other they all rely, dig very inconvenient holes, while on the bottom of a newly dug gun-pit they could rarely be used at all.

Epaulments such as leave the natural surface of the soil as a platform will be better, but they offer a large target and show where the guns are to stand. Thus we see that it will be best for guns to make use of natural cover and the inequalities of the ground as much as possible.

In placing the guns, of course the first consideration is that the ground in front should be swept by fire, and prominent and decisive points must be strongly held rather than an effort made to protect the whole line of front. The flanks will often demand the support of batteries. If guns are placed there they may sometimes, although such an arrangement will not often be advantageous, be echeloned back to the rear, so that if the enemy make a flank attack he may more or less expose his own flank to enfilade fire from them.

Perhaps I ought now to enter on an account of what the requirements of a good position for artillery are, but I really think these are largely matters of common sense, and in any case the truth is that it is never in practice a question of picking and choosing. There is usually not a great deal of doubt in the case of a force awaiting attack as to where the position must be, and its size is restricted by the numbers of the force. The features of the ground, woods, or perhaps buildings, further limit the choice of the artillery commander, and it often ends in his having to put up with what is left to him. But if tactical considerations and natural features leave him any choice he must, in addition to the points the Drill-Book expressly dwells upon, think of one which is not mentioned at all, viz., of the facility for ammunition supply which the ground in rear affords. It is no use putting a gun where it can shoot unless you see your way towards giving it something to shoot with.



There are also one or two counsels of perfection, as I may call them, that I wish to discuss before I go further, and which will rarely or never be possible to realise.

The text-books tell us that if you place batteries in echelon it renders it difficult for the enemy to range upon them. Theoretically, this sounds very well. But if guns be so placed with troops on either side, their field of fire is restricted much in the same way as is that of a gun which fires through an embrasure. Because, unless you make your echelons stand each at least 100 yards from the other, in these days of deep shrapnel effectiveness, they will avail little. The batteries, too, which stand back, must usually have a lot of dead ground in front of them, and as the attack advances will have to cease firing in order that they can be brought forward to see their objective. But there is another difficulty too. We in the artillery are pursued by a terrible bugbear called "a danger angle," and an officer often falls an easy prey to irritation when he finds he cannot fire on account of it. For the benefit of the uninitiated I will define it more exactly. "The line of fire of a gun should not make a smaller angle than  $45^{\circ}$  with the line joining its muzzle to the muzzle of the next gun," so speaks "Field Artillery Drill." If this particular form of worry be pondered over it will be apparent that since the spaces between batteries must usually be economised to the utmost where several are concerned, unless you defy the danger angle, there can rarely or never be any standing in echelon. Consideration as to the danger angle is very necessary, because unless it be kept in view, the premature burst of a shell at practice might mean loss of life. I have never seen it referred to by foreign writers. Perhaps Continental nations do not value conscripts as we do the voluntary soldier, or perhaps the risk is considered worth the advantage gained, or perhaps, which is most likely, we shall all forget about it on service. This question does not, however, affect gunners alone, but the infantry too. All the text-books tell us that it is advisable that the artillery in a defensive position should be placed on a line 500 yards or so behind that occupied by the infantry, and sometimes the re-entrants of the position are recommended for it. The considerations as to danger angles and the restriction of the field of fire involved, which I have just pointed out, should not, however, be left out of sight, and likewise the fact that unless the infantry be pushed well ahead of the guns it will make a double target for the shells of the attack.

A great deal also has been said as to the necessity of not exposing batteries to musketry fire, and for this reason it is argued that they must be kept at least the distance I have named behind the firing line of the infantry. I have indicated pretty clearly perhaps already that the lie of the ground and the value of a good field of fire narrows this question down a good deal, but as regards the losses involved by musketry it may be pointed out that, when likely to be a long time in position, the teams would be away from the guns under cover, and that ammunition would be supplied from the wagons which would be unhorsed. If placed so as to be as little exposed as possible, the losses amongst the men should not be excessive, because the attacking infantry, when it gets within 800

yards of the position, will be engaged with infantry, and will be under a heavy fire from that arm, such as will carry away attention from the guns, and militate against accuracy of aim. During the preparatory action, or artillery duel, it will, nevertheless, be advisable to send forward a skirmishing line, which should be placed some 600 yards in front of the guns, in order to prevent any detachment of hostile riflemen establishing themselves within effective rifle range of the batteries.

It is not necessary, nor would it be possible, except on the actual ground, to specify any scheme according to which the batteries should be distributed; but since, if awaiting an attack, you are presumably anxious to gain time, and playing for safety, it will often be wisest to think first of the weak points of the position, and post a certain proportion of guns to cover them. Some will be detailed to provoke and sustain a preliminary combat, while the remainder may be kept under cover in a position of readiness to act. Above all, although, as I have said already, it is not possible usually to avoid some dispersion of batteries, it is necessary to remember that guns should be kept massed in the defence just as they are in the attack, because effective control and fire discipline are only thus to be obtained.

When the guns are brought up, it should be so as to expose them as little as possible to view, and as plenty of time is available as a rule, they may usually be brought into action by the deliberate method, and often run into their positions by hand. The approach of the enemy's batteries must be closely watched for, and as they deploy a rapid fire must be poured upon them. An intelligent discretion as to how many batteries need open fire must, however, even then be exercised, and as long as it is desired to keep concealed, an unnecessary force, which means an exposure of your dispositions, should not be called into play. Above all is it an error to open on too insignificant a target, such as a comparatively small party of hostile cavalry, or a weak line of skirmishers or scouts.

I think the question of ranges is often a difficult one. In the attack I should be inclined to call 3,000 yards an extreme one, but in the defence the circumstances are different, and when we want to gain time, the loss of a few shells is often repaid, even though small damage may be done by them. Prince Kraft more than once speaks of ranges as distant as 5,400 yards, and his practical experience was such that his words compel our attention. But, except in cases where you command an avenue of approach, and your shells will force a column to deploy, distant artillery fire may mean waste of ammunition, which will be sorely missed perhaps later on in the day.

All the points I have touched upon require judgment, and it is impossible to do more than invite attention to them, and leave decision to the circumstances of the moment.

When the guns of the attack make their appearance at effective artillery ranges, the superior accuracy which the defending guns should possess must be turned to account in the artillery duel. The fire of the whole of them should be quickly turned on the most exposed of the hostile batteries, and it should be smothered. A similar process

should be applied to the next, and so on, until the upper hand has been gained. In the case of large forces the general officer commanding the artillery will have to divide the objective between the brigade divisions which form the mass or masses in which the guns will stand. The hostile line must be divided into sections for this purpose, and each brigade division receive its allotment. Each brigade division would work on the principle of overwhelming successively portions of its objective. When the task of one brigade division is accomplished, it should be told off to the aid of the one next it, and so on. But there is nothing more difficult than to accomplish in practice what I have thus glibly described. Unless a well-matured system exist, it will not be possible to ensure its success, and, if it be not possible, the artillery fire will be without results.

We have had an interesting object-lesson here lately from the battle of Domokos. The Greek artillery occupied a commanding position from which a perfect view of the Turks in the plain below could be obtained. Every hostile gun could be seen, the burst of every shell observed. Not only that, but the Greek guns were so placed that it must have been very difficult for their opponents to see them, and ranging on them was almost impossible. In short, the Greek batteries were fighting under abnormally favourable conditions, their equipment was good, and their training by no means contemptible. Yet they did very little execution. Why? Briefly, because every principle which I have hitherto laid down was violated. In the first place, there was no proper control or direction, and "their batteries were scattered about on knolls and spurs a considerable distance apart, and they worked quite independently." I quote from the able account of Major C. E. Callwell, R.A., which appeared in the *Proceedings of the Artillery Institution* in October, 1897. Five batteries and three guns of position alone were brought into action, while two or three field batteries were held in reserve after the antiquated fashion in vogue 30 or 40 years ago. Common shell (an obsolete projectile) was chiefly used, and even when an excellent shrapnel shell was fired its management was so little understood that it did no harm. The old idea that common shell was for artillery and shrapnel for infantry prevailed on both sides. Yet of so little value is the former projectile that we do not now carry a single round with our batteries. In Thessaly, it is a satisfaction to note, our judgment was fully confirmed, for even when a common shell burst in a crowd of men and horses it often did no injury whatever. Then again, the duel with the Turkish guns began at 3,500 yards, and they never came nearer than 2,000. The catalogue of ineptitude is complete, and is equally full on the Turkish side; but we are not now concerned with the attack, so I need not further refer to them.

With reference to control as distinguished from direction of fire, I may say that this duty falls to battery commanders, and, always of much importance, will become even more so when our batteries are re-armed with quick-firing equipments. "To silence the guns of the attack is the essential object of the defence,"<sup>1</sup> because without the

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<sup>1</sup> "Tactical Retrospect," by Captain May.

support of guns no infantry is likely to make a successful assault ; and the attacking guns silenced, the defenders' rifles will be sufficient to account for the attacking infantry. Therefore, every round in this duel should be most carefully and deliberately aimed, and until the range is established no attempt at rapidity should be made, except to take advantage of a temporary and evanescent disadvantageous situation, such as unlimbering for action, in which the attacking batteries may be placed.

But while *control* may be left to battery officers, *direction* of fire should be undertaken by the higher artillery leaders. At one moment it is right to fire on artillery, at another, infantry should be the target. To compel an early deployment from close formations is one object of artillery fire. When the infantry of the attack come within effective range they must be fired on, and yet again when the batteries on that side prepare to move forward to another position will be the time to pour shells upon them. When later the lines of attack become developed, a choice must be exercised as to the line which is to be made the target. It is impossible to lay down hard and fast rules on these subjects ; one line may offer a more tempting target than another, but the one which is the most dangerous is the one usually to lay upon. There are, perhaps, two principles which however will never vary. When artillery is awaiting attack the first thought of its commander after the fight has opened should be, Where will the enemy's batteries move to next ? It will often be easy enough to answer this question, and every preparation should be made to make the change of position perilous. Secondly—and I may explain that, although it may appear contradictory to something I have just said, it is not really so, because in practice a considerable space of time will separate the appearance of the hostile batteries and their infantry—when the infantry do advance to the attack, all the guns of the defence must turn upon it. It is infantry which win victories, and it is the infantry which must be prevented from getting to decisive musketry range.

In this connection we may note how much the long range of rifled guns has accentuated the importance of fire direction. Formerly there was little choice, and men fired at what was opposite to them and immediately in their view ; now there is room for considerable selection, and time to make a judicious one, while stratagem can be exhibited also.

It is one of the advantages of the artillery of the defence that it need not move in the main position, whereas that of the attack *must* manœuvre. And it may be well to take advantage of this source of its strength. For example, if the fire of the attack begin to show a decided superiority, the guns of the defence may cease firing, in the hope that their opponents will proceed, as under certain circumstances they frequently will, to move forward to a fresh position. Then it may be possible to take their batteries at a disadvantage while in movement, and make them pay dearly for imagining they had gained a permanent and complete mastery. We know that the experiences of the artillery of the German Guard Corps at Sedan show that one side ceasing fire will often cause the other to do so, and when the German gunners were told to "stand fast" on that occasion, in order that the commanding officers might look over and correct the laying, the French ceased firing too.



But it may often be wise to withdraw from the artillery duel simply to economise men and ammunition. It may, for instance, become apparent that, if you continue the struggle, your batteries are bound to be completely knocked out, and then there will be no artillery fire to meet the hostile infantry. In that case the guns may either be withdrawn a little way behind the crest, or, what will perhaps more often be feasible, may be left in position but their detachments withdrawn and placed under shelter.

The actual guns are practically none the worse for being fired upon by shrapnel, even if the enemy, which is scarcely likely, should continue to fire on them, and the gunners can come up and man them again when the infantry of the attack is fairly committed to an advance.

There are excellent examples of a correct and scientific handling of artillery to be culled from some of the battles during the American War of Secession. We hardly hear as much as we ought to do of General H. T. Hunt, who, more than once, displayed something akin to genius in command of the Federal artillery, but we may learn lessons from him even though his deeds belong to a fast-vanishing epoch.

At Malvern Hill, a sanguinary battle fought in front of Richmond, July 1st, 1862, the power of massed batteries in the defence of a position is splendidly exhibited; but it is to Gettysburg, fought a year later, that we must turn for the best illustration of the system of temporarily withdrawing guns with which I am acquainted.

Lee had entrusted to Pickett's division the duty of making the great assault on the Federal position. Some 150 guns prepared the way for that celebrated charge, and the Federals, hampered by want of room, could only place about 80 guns in position on the heights opposite. The tremendous cannonade began about 1 o'clock, and two hours later General Hunt, wishing to preserve as many guns as possible intact, and to husband ammunition to meet the inevitable assault, withdrew 18 guns, and ordered the Federal artillery to cease firing. The manœuvre quite deceived Alexander, who commanded the Confederate artillery. He sent back to Longstreet, to whose corps Pickett's division belonged, to say that he had silenced the hostile guns, and that the moment for the assault had come. Meanwhile Hunt refilled his limber boxes and refitted his damaged batteries. When the Confederate infantry came on, the empty positions burst forth in a fresh and unexpected eruption of artillery fire. The Confederate artillery was disregarded, and every round was aimed at Pickett's battalions alone. On and on that gallant infantry swept, until it disappeared in the smoke of the guns in front. For five minutes it attempted to make headway amongst that smoke. Then a few disorganised stragglers began to emerge and fall back, more followed, soon the closed bodies began to melt away, and Lee, who was watching it from Alexander's guns, knew that such an army as he could scarcely hope to lead again was broken.

Now, perhaps, I may touch upon quite a new idea which Colonel Wille, the well-known Swiss authority on artillery, has lately put forward. He apparently seems to think that if the two artilleries engage in a



prolonged combat, and the infantry defer its advance until one has got the upper hand, so much precious time will have been wasted, that none in which to win a battle will remain. Therefore, his view is that the artillery of the attack should devote its main energies to shaking the infantry of the defence, and that it will be a mistake for it to suppose that it is a paramount object for it to silence the guns opposed to it, and that only when this part of its task has been accomplished should it turn its attention to the infantry. He goes on to add that in his view it is best to hold the main body of the artillery of the attack under cover until the infantry is ready to deploy into attack formation, and then let the batteries come up fresh. To distract the attention of the defence and draw as much of its artillery fire as possible, some batteries of the attack might be deployed at an earlier stage. These ideas do not appear to me sound, and seem to suggest a return to the old-fashioned reserve of guns which Napoleon brought up to prepare the way for a decisive stroke, a system which does not turn the powers of modern guns to full account. I merely mention them to show how widely some authorities may differ from the usually accepted principles of the day; and also because it is certainly a fact that we do not yet know what effect the intervention of a completely fresh mass of artillery may not mean in a modern battle. Such suggestions as Wille's "be for thoughts," even though we may not approve of them.

Hitherto I have not said much with regard to manœuvring on the part of the guns of the defence. It is by no means, however, a matter of which we should let ourselves lose sight. It is with the counter-stroke that the defence breaks its fetters, but a counter-stroke unsupported by artillery fire will never have a permanent influence on the fortunes of the day. At our manœuvres we rarely see such an enterprise undertaken, because the fight progresses so rapidly that it is usually brought to a close before there is time to plan and develop it. But at foreign manœuvres counter-attacks are familiar occurrences. I do not refer to the small local affairs which are perhaps sometimes carried to an excess over the water, but to those on a large scale planned and carried through by the higher leaders. It is a difficult matter for a man to rapidly grasp the situation, and make up his mind with such prompt decision as will alone seize an opening in the course of a battle. Especially is it so, if he be the weaker, and has in consequence at first been forced to assume a defensive rôle. Yet Wellington was accustomed by the force of circumstances most often to fight on the defensive, and he won Salamanca by a most brilliant counter-attack, and indeed never failed to take the offensive at some part or other of all his battles. But he supported his counter-strokes with artillery, and twelve guns went forward with Pakenham's division, and materially contributed to the success of Salamanca. Marmont's guns similarly assisted the turning of the tables at Marengo, and at Austerlitz Napoleon gave the impetus of artillery to his blow. On the other hand, the French counter-attacks at Wörth died away, because not on an adequate scale, and because unbacked by batteries. When a counter-attack aiming at important results is launched,

guns must nearly always go with it. Otherwise their fire will become masked at a critical moment, and the infantry will feel the absence of the support their sound close at hand invariably lends. It may be necessary, therefore, to shift guns from the main position during the course of battle, and we have no reason to suppose that such an operation will be impossible in the future. Guns may be run back and limbered up behind the crest in many situations, and thus the exposure of the teams when limbering up may be avoided; while we know that the German batteries were able to accomplish it in the battles round Metz and at Sedan.

On the 10th of September, 1897, at the French manœuvres, I saw a very striking example of a large counter-attack, brilliantly conceived and admirably carried out by a division of the Southern Army on the troops holding the château and park of Villers-au-Flos. On that occasion the two horse artillery batteries of the cavalry division, which was halted behind General Kessler's left flank, were sent forward to co-operate with the other guns of the division. But the moment the counter-stroke had exhausted itself, these batteries were recalled to their special duties, and a very short time afterwards were, as a matter of fact, engaged in a great cavalry and horse-artillery action. I thought the manner in which these guns joined in that counter-attack was admirable, but I made a mental note, too, that if the batteries with our cavalry divisions should thus be temporarily employed, the French system, by which they were again placed entirely at the disposal of the cavalry general, should also be imitated.

A point about which there is sometimes a little misunderstanding occurs with reference to guns retiring. In certain defensive actions of course their duty is clear, and they simply stand *à l'outrance*, and possibly are sacrificed. But it is a rule that on all occasions guns are not to retire without orders from the supreme authority. The rule should be most rigidly adhered to, for nothing may have a more pernicious effect on the course of a battle than the premature or inopportune withdrawal of guns. On the other hand, when an uncompromising and passive resistance is not intended, guns may be left behind unnecessarily, and will either have to be extricated with difficulty and loss or abandoned. A general must remember, therefore, that unless he has agreed beforehand to trust to his artillery leader's discretion, he must direct the movements of the guns in this respect himself. I do not, of course, here refer to a rear-guard action in which a small force of infantry, or cavalry and horse artillery is engaged. Then, it seems to me, that the gunner must often be trusted with and take the whole responsibility when he is separated from his chief. The Drill-Book, however, has no saving clause in it such as this, yet I imagine that it is not intended to be taken so rigidly as it reads.

In conclusion, a few words on ammunition supply will not be out of place.

It may at first sight seem that the provision of ammunition will be easier for the force that is at rest than for that moving to the attack. A

force pushing forward, as it approaches its enemy, usually prolongs its lines of communication, and at the moment it halts for a battle has often stretched the channel it is fed and supplied through to its fullest extent. The slowly moving ammunition columns and parks have to be urged onward on roads always crowded and often bad, and long distances may sometimes separate the guns from the reservoirs whence they draw their vitality. On the other hand, it may be imagined that these reservoirs in the case of the defence may be pushed up beforehand close to the line of battle, and that comparatively small hindrances need obstruct the flow from them. But a force does not often stand to fight with the possibility of a retreat being absolutely eliminated from its leader's mind. And in the latter eventuality the communications to the rear must be as clear as possible for the uninterrupted retreat of the fighting portion of the force. Ammunition columns or parks and other impedimenta should encumber them as little as may be. A force retreating is doubling back on, while a force advancing is freeing itself from, its own encumbrances. In the one case we have to fear over-compression, in the other over-extension. This is why ammunition supply is by no means so simple a problem for a force on the defensive as might be thought; and unless as many as possible of the wagons of the ammunition columns be got rid of early in the day, a retreat may mean the loss of a great deal of ammunition, or may be greatly hampered by the congested state of the roads. It may therefore be well to empty the three A. and S. gun ammunition wagons of the column first, by making a sort of temporary expense magazine close to the batteries from which the guns would draw in the commencement. These empty A. and S. wagons might then be early sent away to be filled up or replaced at the ammunition park or advanced dépôt, as the case might be. Artificial cover could usually be extemporised, and the ammunition protected from wet. By this means the immediate battery reserve would be kept intact as long as possible and the danger of the batteries running short of shells well-nigh obviated.

The carrying out of any expedients such as I have suggested must, however, be left to circumstances. All that can be done on paper is to indicate and suggest a method of action suitable only for batteries in a defensive position. But a reference to ammunition supply opens up the question in a more general form. In view of the probable expenditure of ammunition in the future it seems to me that we have here a branch of tactics to which more attention should be given. It is a very pressing matter to my mind, not so much because improved manufacture has given unusual facilities to shooting, and that it is easier, and will be even easier still, to get rid of ammunition in the future than it has been hitherto. There is a danger here no doubt, but it is one which can be counteracted by fire discipline, and I have no fears but that however rapidly it may be possible to shoot with a quick-firing gun our officers will be able to completely control their fire. But where both sides are equally well armed, and where guns have an immense range, battles may begin earlier and may be more protracted than heretofore. It has often happened even with smooth-bored firearms that a battle lasted more than one day.

It will very likely be that in future such long-drawn-out struggles will become more common; there will at least often be a possibility that one day will not yield a decisive result, and we must be prepared for such an eventuality. Therefore, allowing for complete fire control, it still seems that the consumption of ammunition will be greater, and the necessity for a speedy and safe renewal of it will be more imperative than our past experience has taught us. We want, therefore, not only a well-thought-out system of supply, but we should make officers of all arms familiar with it by practically seeing it at work in the field. And that I regret to say is exactly what we do not do. Theoretically, we have now got the system, and the latest edition of "War Establishments" shows us how our ammunition columns are composed. But at the recent manœuvres they were very inadequately represented, and no ammunition wagons accompanied the guns, except one per battery, which was valueless for instructional purposes. Ammunition supply from the battery wagons to the guns is practised during the drill season at our larger stations, and when a brigade division is carrying it out, the sight is a most instructive one. No one who has seen it can fail to realise what it implies, and what activity would be taking place behind a great mass of several batteries in position when drawing on their wagons for ammunition, as they would always be doing in a defensive action. Until the whole system is actually seen in full operation officers do not appreciate the necessity that a position should have considerable depth, and that artillery in action takes up far more room than that which is occupied longitudinally by the guns. Again, the length occupied in column of route by a battery accompanied as it would be on service by its wagons is just double what it is without them, and to arrange the order of march for a wagonless artillery is poor practice for staff officers, and engenders false notions as to time and space. For all these reasons, but above all perhaps to give the other arms correct ideas as to needs and requirements of artillery, a great effort should be made to represent our wagons and ammunition columns more realistically at manœuvres.

It is, I presume, a matter of money—everything comes down to that in the long run—but if money is not to be had for the purpose, we must turn what we have to dispose of to better account. The policy of breaking up batteries to make ammunition columns, or provide horses for wagons for others, is a hateful one. It disgusts officers and men perhaps more than anything else, and, moreover, it sacrifices during the whole manœuvres the training of one lot of officers and men in their most important duties for the benefit of another. I sincerely trust that we may not see any expedients of this kind adopted. It would be, in my opinion, infinitely better to put all the artillery in camp on one side for one fight, or perhaps two at each series of manœuvres. The side which had the double lot of guns might then attack the other which would represent a marked enemy, and the additional batteries would park their guns and use their limbers to represent the wagons of the guns in action, while a concentration of all the wagons (supposing each battery at manœuvres to have one wagon with it as was the case this year) would pretty well make



up a complete ammunition column. If another day could be spared to repeat the process, with the forces playing reversed rôles, both sides would see the artillery of an army working far more nearly under service conditions than we have ever seen it yet at either field days or manœuvres.

No doubt such an arrangement would not be an ideal one, and no doubt we should hear murmurs. I am sure I should hate it the day my battery was playing the part of the loader at the covert side, but all the same I believe it would be beneficial, and it would be better to have such a system than nothing.

But that by some means or other we should practise the supply of ammunition and accustom men to regard it as a first consideration when they make their dispositions is, I am sure, essential, and, as I have shown, the problem is more difficult when on the defensive than when in the attack.

As regards how guns should be retired, should a retreat be ordered, it is scarcely necessary here to discuss, nor need I enlarge on the tactics considered in the Drill-Books under the heading of a "Rear-guard Action," but in bringing a lecture on artillery with a force awaiting attack to a conclusion, I may perhaps most fitly do so by saying that when the force stands up deliberately to fight, the retirement of the guns is about the last contingency which is to be provided for. An unflinching front may turn the scale even when things look blackest, while to be captured when in flight is the worst fate that can befall a battery.

General E. F. CHAPMAN, C.B., R.A. (Commanding Scottish District):—The only occasion I remember in which guns were placed in a position of defence such as the lecturer has outlined was in the campaign of 1866, when the artillery at Chlum, during the battle of Königgrätz, held the position for some hours. I saw the position a few days afterwards, and I recollect ranges of all the positions were very carefully marked, and the battery positions were clearly defined at the time. Major May has laid stress on guns not having to retire. In that position, and in any other position held purely on the defensive, it must, I think, involve a retreat. If I remember rightly, the Austrians lost very few of their guns, because they had carefully considered the methods of retreat; they had worked them all out, and their staff were prepared to handle the guns in retirement after the action. Of course, the position was turned by the Crown Prince moving nearer Königgrätz, when Chlum had to be abandoned. The whole force had to go back without any consideration as to what the artillery would do. A general retirement was ordered by Benedek, and the guns were withdrawn. In my opinion, we shall always have to consider a possible retirement from any defensive position that might be taken up.

The CHAIRMAN (General Sir Redvers Buller):—If no infantry officer wishes to speak, I should like to throw myself in the breach. It is rather difficult to deal with the paper, as the author treats of two distinct phases of war, and those I think he has rather confused together. There is the case of a force which deliberately elects to commence the attack by adopting a defensive rôle, probably because its infantry is not all up or because it is a weaker force, and there is the case of a force which is placed in a defensive position beyond which it does not mean to advance. I think the second case I would rather leave out of consideration to-day, and deal only with the first, which I fancy is the one that Major May is more immediately referring to. It seems to me that the real question which must settle the distribution of the artillery is that the officer commanding the force must make up his mind at once how he is likely to be attacked, and the distribution of the positions to be occupied by his artillery



must be from the commencement subordinate to the answer he gives to that question, and to the corollary to it, that if he stands to be attacked he will not win the battle unless he has in his mind some effective counter-stroke. His own idea with regard to where he is likely to be attacked and his plan for the counter-stroke he intends afterwards must govern to a great extent the positions which he assigns to his artillery. I was reading a week or two ago a very interesting book which has just been published, called "A Lad in the Peninsular War," in which is described how in moving out from Corunna Sir John Moore worked out his plans to stop Soult. The author says that his regiment was at first in reserve, but only for a short time, while Sir John Moore was making up his mind which was the part of his line most likely to be attacked, and that Sir John knowing that he had one of the most able of the French marshals against him, decided that he would be attacked in exactly the same way as he would have attacked had he been on the French side. He was right, and his whole dispositions for the day were made really with reference to the actual attack. (I think we all believe that had he lived his dispositions would have been completely successful.) It seems to me also that in laying down rules for where artillery is to be or how guns are to be massed or divided, we must be guided by the nature of the ground that is occupied by the defending force. The question of dead ground is, in defence, most important, and if you have much dead ground in front of any place that offers great facilities for the massing of a large number of guns I would say Beware! If you so place guns that the other infantry are able to get within effective distance of them, and then be perfectly safe from their fire, your defensive position will be in far more danger than if you had scattered your guns and arranged to flank this dead ground and keep it under fire. I quite agree that in a sense the artillery and infantry are one, and that their combined action in war may be considered as if they were only one arm. It is most important, however, to stop the actual infantry attack, and I question if in defence it is nearly so important to enter into an artillery duel as it is in offence, when you must gain time for your infantry to deploy and their supports to get into proper position, and, if you can, you should occupy the enemy's artillery while they are doing this. I doubt myself if the great stress which the lecturer has laid on the necessity of massing guns and destroying the artillery of the offence is of the same importance as destroying the attacking infantry, which, to win the battle, must come in front of their guns. That I believe should be the main duty of the artillery of defence. I offer these remarks as an infantry officer, the infantry officers having been challenged to give an opinion.

Major MAY, in replying, said:—With regard to what fell from General Chapman, with reference to due preparation for the retirement of artillery being necessary, and the example he quoted from the campaign of 1866, the Austrians certainly had much cause for satisfaction as regards the manner their artillery was handled on many occasions during that disastrous war. The Austrian batteries too have prided themselves very much on the devotion exhibited by the guns which covered the retreat of the rest of the army at Sadowa, and the conduct of some of them on that day has become celebrated. Some critics have, however, not failed to assert, and, I think, perhaps, with some truth, that a great deal of the kudos they gained was perhaps hardly so well deserved as might at first sight appear, because, bravely as the gunners stood their ground, and unhesitatingly as they sacrificed themselves, those batteries could not help themselves, and did not retire because they could not. General Chapman does not seem to take the same view as these critics; but, on the other hand, it is to be remembered that if the artillery is not to stand firm, the other arms will not be able to get away. But when I spoke in my lecture as I did, I did not mean that you were never to have in your mind some idea of retiring, and some general scheme as to how the retirement of your artillery was to be carried out. I certainly do not recommend the unnecessary sacrifice of guns, but there were so

many points to touch upon that I really had not time in the hour to go closely into all of them. A good deal of the question of how to retire artillery comes under the head of "Rear-guard Actions," and as the possible withdrawal of guns would not be a question of the first consideration when taking up your position, I passed that part of the subject over so as to have more time to discuss matters which are less clearly understood, and of at least equal importance. I quite agree with what Sir Redvers said about firing on the infantry of the attack, and I hoped I had made myself clear on that point; but, leaving other considerations out of sight, until the infantry of the attack appears we have no target but artillery to fire at, and must perforce engage the hostile batteries. Therefore, the contest between the two artilleries, even supposing it to be an undesirable feature in modern battles, becomes more or less inevitable. But one of the things we in the artillery are taught, and, I believe, try to carry out as much as possible, is, that the moment the infantry of the attack shows itself in any large numbers it must be fired upon by every gun. It was by doing that, I think, that the great success of Gettysburg was gained. The Confederates had an immensely superior force of artillery, and if the Federals had attempted to engage them they would have been destroyed. But they, as I have shown, withdrew from the unequal contest, and absolutely disregarded the artillery, and fired at nothing but Pickett's division. I am quite sure that was the proper course to take, and the victory of Gettysburg is to be attributed to its having been adopted.

The CHAIRMAN:—I have great pleasure in asking you, gentlemen, to pass a vote of thanks to Major May for his paper. It is a paper which gives one a great deal to think about, and I am sure we all of us agree with his final paragraphs, where he shows plainly how important it is for artillery to have every possible opportunity of studying that most difficult of all problems—the best manner of keeping up the supply of ammunition.

Major May's paper was afterwards read before the Military Society of Ireland at Dublin, on February 16th, 1899, Field-Marshal Lord Roberts, K.P., G.C.B., G.C.S.I., G.C.I.E., Commander-in-Chief of the Forces in Ireland, being in the Chair, when the following discussion took place:—

Major-General M. W. E. GOSSET, C.B., *p.s.c.* (Commanding Dublin District):—When we hear so able a lecture as that delivered by Major May, it rather cuts the ground from under our feet, because he leaves nothing for us to criticise. Moreover, it is very difficult for an infantry officer to criticise so able an exponent of the subject of artillery, as Major May undoubtedly is. He has incidentally touched upon one or two points which bear upon combined action of the three arms represented by artillery, cavalry, and infantry. And I think I may say that the one great value of this very interesting lecture to me, as an infantry officer, and I think I may say to all infantry officers, is the pointing out how necessary it is for all bodies, both cavalry, infantry, and artillery, to know the working of the different arms to which they do not happen to belong. It is a matter of which quite enough is not thought in our Service, at least as far as my experience has taught me. And although the synopsis for examinations in the Queen's Regulations at the present day lays down pretty clearly that officers are obliged to study the combined action of the three arms of the Service, still we do not begin to acquire that knowledge early enough, and as a result it is confined very much to senior captains and majors. Therefore, you will observe that they do not begin to study until they have got on pretty well in the Service. With regard to artillery, I would like to make just a few remarks as to my experience of the working of that arm of the Service in manoeuvres. I had the advantage, when stationed at Bangalore, where I was in command, to have had three batteries—one horse and two field

batteries—with the force which was quartered there. And in the small manoeuvres we had, I made it a point to take the command of batteries from the majors and captains, and to give them occasionally to the subalterns under them. These subalterns were very excellent men—very smart officers. But when they got command of their batteries, it was a most extraordinary thing to find what dreadful mistakes they made—mistakes you would hardly expect that an infantry officer would make who studied the subject at all. I remember on one occasion I gave a subaltern command of a battery in an attacking force. He came into position, but changed it in about a quarter of an hour, and then changed it again, quite forgetting that during that time he was being raked by the enemy's artillery. Many other faults were committed, such as putting wagons in a position where the shells which missed the gunners and the battery would undoubtedly fall upon the wagons, and the men round about them. This led me to believe what an excellent thing it is for young officers to get a chance, even in a small way, of commanding the units, to which they belong. I think, if there is a fault in our excellent artillery, it is to be found in the fact that the major, who is everything, is a little too much; that is to say, he takes everything under his command. He works up his battery, but he does not, perhaps, teach his subordinate officers enough. I therefore bring this matter forward as a criticism on the paper, being a thing worthy to note, and which I am sure Major May will be glad I should mention. I have no doubt that we have got to learn a great deal of what smokeless powder will do in the future, and in that connection I think the question of an advance post in front of a position may be altered to a certain extent. Major May, in the course of his lecture, remarks that we never use a counter-attack in our manoeuvres, which is no doubt very true. But, as he very justly states, it is because that when the attack is once developed we rush it to such an extent that there is no time for a counter-attack at all. We might now very well consider the question of an advance position with our smokeless powder, which would oblige an enemy to open at a distance, and also to attach guns to it to give it further power; and if we want to make a counter-attack, that it would be a very good point to bring the force up to with which you make the counter-attack. As regards the breaking up of brigade divisions, that is an artillery question about which I have not got much to say. But I have always noticed that the commander of a brigade division is extremely anxious to keep them together under any circumstances. Major May brings the practical question of breaking up brigade divisions before us, and he gives an example of how the breaking up of brigade divisions is very essential in manoeuvres. There is no doubt about it that in a force awaiting attack, you might with advantage break up a brigade division, provided always you could manage to keep some sort of control over it; and in these days of inter-communication by telegraphing, signalling, and other means a good deal might be done in that connection. With regard to the limit of range, that is a question which depends on how far you can see; though I doubt whether you can count upon anything beyond 3,000 yards. Prince Kraft, with his 3,400 yards, seems to ignore the fact that even if you can see at that distance you cannot judge the result of your fire, and it is, therefore, a question of range vision more than the range of your gun. I may, perhaps, mention that in the Cape Kaffir War I had some curious examples of miscalculation of ranges, and though in that wonderfully clear climate you can see exceedingly far, the distances are always very deceptive. A battery opened fire upon the enemy in the bush one day. I happened to be far away on the flank, but I could see quite plainly the shells bursting about 2,000 yards off. The range was calculated in that clear atmosphere as at 2,500 yards, but it was proved afterwards to be no less than 4,500 yards, which shows how difficult it is to judge your ranges in different climates. As regards Colonel Wille's—of the Swiss Army—idea, when he says that the artillery attack would direct its fire on the infantry right away, he assumes that long before the fight begins—that is, the infantry fight begins—the

whole defence would be in position. That is a mistake we have to guard against. Because my experience of the manœuvres generally has been, that if an officer is ordered to select a point for defence, or to await attack, as Major May very properly called it, he digs his trenches, he gets his men into position, he gets a sort of sign-post to fire at, and the enemy may perhaps attack him in another direction. The result is, that he has to re-assemble his forces, and the whole thing results in a jumble. Make your dispositions for defence, think how you would attack them if in the enemy's position, and do not occupy trenches by men before they are wanted. In the same way, the guns would be kept concealed until they were required. These are all the remarks I have to make on the subject of Major May's very interesting lecture.

Colonel C. F. C. BERESFORD, R.E., *p.s.c.* (Chief Engineer, Ireland) :—There is a short paragraph in the introductory part of the paper, which we have just heard read by Major May, which appeals to me specially as an engineer officer, because what it states applies to the technicalities of the engineer service just as much as it does to those of the artillery service. The lecturer has spoken of the necessity of combined tactics, and how the staff, generals, and other branches of the Service should have a good knowledge of the working of artillery. I hope I shall be excused if I read to you this small paragraph :—"An arm which prides itself merely on technical knowledge and skill, and, because of its supposed technicalities, is not confidently handled by an officer alien to its ranks, will always be imperfectly understood, may even itself become prone to find excuses, and create impossibilities." Now, I should like to draw a moral from that paragraph. The lecturer spoke on the subject of the knotty question of breaking up brigade divisions during the fight, and he told us how an artillery commander may find his batteries disseminated on a long front, and how his whole thoughts would be taken up by planning the way in which to bring control of fire, and direction of fire, under one will. And he further told us that it is absolutely necessary that this control should be brought under the command of the higher artillery officer. But all this means that efforts are to be made to bridge over time and space. I only know of one agent that can properly bridge over time and space, and that is the field telegraph. I was for many years attached to the telegraph battalion at various stations, and I think I know pretty well from experience what the field telegraph can do, and what it cannot do. When I was at Aldershot I was constantly advocating the adoption of the field telegraph for tactical purposes, but I made no great progress in that effort, simply because its technicalities were not understood except by the officers and those who were actually working with it. I could not persuade the staff or general officers to work it at manœuvres to the extent I should have liked to have seen it used. But I feel confident that if the field telegraph was called on for any tactical purpose whatever, it would be found perfectly equal to the occasion. I always advocate in writing and in lectures at Aldershot the use of the field telegraph. But I wish clearly to be understood as to the position I take up, namely, that the field telegraph for other arms of the Service could not always be drawn from the telegraph battalion. The telegraph battalion worked by the engineers will always have its hands full with the lines of communication, and, therefore, what I advocated was the employment of regimental field telegraphs, so that every unit should have a regimental telegraph of its own. For instance, if the artillery had an equipment of its own, if such an equipment was attached to a brigade division, it should be entirely in the hands of the officers commanding brigade divisions during peace and war; and, as a consequence, I feel quite sure that very great progress would be made in the tactics of the artillery. In conclusion, I would ask the lecturer whether he has ever considered the subject of the field telegraph, and whether he has ever had any experience either at home or abroad of its being used for this tactical purpose.

Colonel W. G. KNOX, C.B., R.H.A. :—A lecturer always in his lecture, in my opinion, refreshes our minds very much in history. And



on this occasion, Major May stated at the opening of his lecture, that we hitherto have always fought on the defensive, and that our future battles will also be fought on the defensive. Well, I must say, that we get simply flooded with the attack formation, though we never, to my mind, half think about defensive formations at manœuvres. The lecturer has spoken very much about the massing of guns, but I think he has rather overlooked the fact that in our Service we miss a very important part of our training by not having smokeless powder in use during peace manœuvres. And, perhaps, I may be allowed to give my experience of what use foreign nations make in their trainings and tactical formations as far as artillery is concerned, by having smokeless powder. I must say it is the very gravest and most serious accusation that one can make against our arsenals and their directors, that they do not furnish us with smokeless powder. No doubt they have tried cordite, but there is no reason why we should not have some other species of smokeless powder than cordite. I was present during the manœuvres in Germany in 1897, where the largest manœuvres took place that have ever been held in that country, and possibly the largest that may ever be held there. There were four army corps at work, two on each side. My first day's experience of them was very interesting indeed. I heard the sounds of guns away in the distance. It was a dull, dark day, and I could not, therefore, see the guns anywhere, but I could hear them. However, with great difficulty I found them, but it was not until I was 900 yards off that I saw them. They were posted in front of a wood in some thick brushwood. I could see occasional flashes, but I could not detect the number of guns, and, to my extraordinary astonishment, when I got up to where they were, I found these guns were assisting a counter-attack. There were sixty guns on a front of 300 yards; that is to say, 5 yards a gun, all being under the direction of one man. When you see those large forces at work, you do not narrow your mind to a brigade or a division, as they all appear to be working thoroughly easily. This experience opened my eyes immensely. In our Drill-Book I find only a front of eighteen guns is allowed or is mentioned, so you can imagine the contrast. The next day, the force on one side had to take up a defensive position to await an attack, very much as Major May describes it, from the complete force on the opposite side. It had to await an attack with two army corps, minus two divisions, waiting in position the arrival of a force to complete its position. I rode along the whole position, which was about 5 miles in length, broken in front by two villages. I was very much interested to know as to whether the villages through which I rode were to be occupied as advance posts. The idea of advance posts seemed to have vanished entirely. With regard to entrenchments thrown up, they dug a line of them, and small posts of entrenchments were dug which were occupied by infantry, covered in by ground. Works were thrown up for batteries, for guns, at closest interval, only at such position where it was necessary for the guns to run forward to cover at right angles the dead ground where expedient. The troops did not occupy the position as a whole, but they were held by a thin line of skirmishers. The troops themselves were in column in rear, on the reverse side of the hill, so that they were ready to man the entrenchments where necessary, or to form *en masse* on the flank for counter-attack. That is the principle upon which this line of defence was occupied. I must tell you that the normal distance occupied by foreign guns as compared with ours is very much in their favour. They learn with smokeless powder to drill very much closer than we do. Our eighteen guns would be met on the same line of front by twenty-four French or twenty-four German guns. The Germans even run up to thirty-four guns—they allow that in their drill-books. That is a very serious question, and as there is no doubt that our men, as far as organisation goes, are pounds better than either French or Germans, there is no reason why they should not drill up to that form. Major May remarked about guns being under the command of supreme authority,



and of being taken away from their units. He also alluded to the French manœuvres of 1897. I was absolutely present on the very day that Major May describes. With regard to the guns being put under the command of supreme authority, I happened to have the orders of the French commander on the one side, who was commanding two army corps, which were attacking one. He got his opponents on the hop, and he went to follow them with his advance guard, which he told off from each army corps. He put the whole of his artillery with the advance guard. He meant to keep his opponents on the hop, as I might say. Now, gentlemen, whatever kind of tactics we might employ for the defence or for attack, the keynote of the whole thing is that drill leading up to combined tactics must be based on simplicity, and that must begin with the individual. But I must say, in our Service we do not fulfil the desired simplicity. I was looking this morning at the manual for rifle exercises, and I find that there are no less than forty-two different ways of handling a rifle in our Service; and I looked at the Germans, and found they have only three. That sounds to me very strange, and appears as if something might with advantage be knocked out of ours. These different ways of handling a rifle do not include the funeral exercise. It is just the same with our cavalry. There is one word the lecturer made use of, and I do not quite understand why. He states, "Artillery in conjunction with a force awaiting attack." I cannot understand why he used the word "conjunction," and that instead he did not use the word "combination." We in our Service seldom act in conjunction, because we are not organised in conjunction. But we have a glorious heritage from our national games which goes to show the force of combination, and no better examples could be given than the games of polo and of football. We have in this country now, thanks to your Lordship's exertions, an opportunity of carrying out combined tactics on a very superior scale, and that to my mind is field-firing. It is about time that infantry officers and artillery with their live shot and shell should work together. We have now a large tract of ground where field-firing can be carried out, and I think that if, instead of going to manœuvres, we went there with our ammunition supplies, and with our picks and spades and shovels, and occupied defensive positions such as Major May has described in his lecture, and then attacked them, I must say the benefit to us would be much better than going to the ordinary peace manœuvres.

Major MAY, in reply to the observations made on the lecture, said:—Colonel Brooke has written to me a letter which I shall read; after a few preliminary remarks of a flattering character, he states:—"The lecturer does well to dwell so emphatically as he does on the importance of training in the renewal of ammunition, for the greater the expenditure becomes the greater the necessity of having *personnel* to work its replacement. It is, to my mind, waste of time bringing up batteries to form ammunition columns, for the officers and men thus drawn may belong to batteries required for fighting when the pinch comes. And I agree with the lecturer, that at the recent manœuvres, the effort to represent these columns was merely clothing a skeleton in uniform. Let us hope that before the next big manœuvres we may have advanced a little towards replacing the skeleton by something more tangible, and calculated to give proper experience of ammunition supply on active service. I think the system is being thoroughly thought out. I regret to find the lecturer referring to the getting rid of ammunition. To speak of ammunition as being got rid of, is calculated to give rise to misconception, for I agree with the lecturer that our officers would be as capable of controlling the promised increase, as they are that of the present supply to the guns. I am sure the lecturer used the expression inadvertently. It seems doubtful to echelon guns for attack on the flank. By doing so you must sacrifice flank fire to meet flank attack, but even then the battery or batteries have to meet the flank attack. Would it not? . . . . . I hardly think the lecturer has made it clear that once the infantry attack, the artillery must devote all its fire to it, just as Hunt did at Gettysburg. The Confederate artillery was

entirely disregarded there, though the latter had a preponderance of guns, almost amounting to two to one. A better example could not be quoted to show to the artillery the value of what the lecturer, hardly, to my mind, has laid enough weight upon." Gentlemen, with regard to that, I am sorry I used the words "Got rid of"; it was merely accidental—any other words would suit as well. As regards accentuating artillery turning on the infantry of the attack, I really thought I had done that, because I said that there were only two great principles which never varied. One was that the officer commanding the artillery was to think where his opponent would go to next; and the other was that whenever the infantry attack appeared, every gun was to be turned upon them. As to echelon-ing guns on the flank, that is really a matter of circumstances and of degree. As regards what General Gosset said, I must thank him very much for his very kind remarks, because I think his criticisms were very valuable indeed. I think very likely he is right that we majors do not give our subordinates enough chance. But the reason of that is, because we know by practice a great deal depends upon us, and therefore we take every opportunity of teaching ourselves. However, that has been noticed, and now when a battery goes to practise, they make casuals, as they call them, command; and it is quite a common thing for a battery to be commanded by a subaltern. In fact, two years ago at Aldershot they carried it to such an extent that we had a telegram from one of the officers stating that a battery had been brought out of action by the master tailor. As regards the long ranges, I quite agree with you, Sir. I look upon 3,000 yards as quite an extraordinary range. I referred to them simply to show that on the defensive you are governed by different ideas than in the case of attack. As regards the field telegraph, the subject was mentioned to me one day at Aldershot of putting the artillery in connection with it. My impression is that a brigade division would be too small a unit to have a field telegraph attached to it. But I think where you have very large numbers of guns, as in the case of an army corps, you might use it. I think Colonel Knox's remarks were very valuable. I used the word "conjunction" merely because it seemed to me much the same as combination, and I thought it sounded a little better.

The CHAIRMAN (Field-Marshal Lord Roberts):—Major May has delivered a very interesting lecture on the part played by artillery acting—I won't say in conjunction—in combination with a force awaiting attack. And he has explained that this is a phase of war which is not often discussed, but I certainly think it is a very important phase of war, and more especially is it so for officers belonging to a small Army like ours, which Major May has stated has so very frequently been required to act on the defensive, for a time, at any rate. But I noticed throughout his lecture; he does not refer in any way to what we call a passive defence; but he rather refers us to the case of an officer taking up a position, with a determination to make a counter-attack on the first favourable opportunity presenting itself. This officer decides that he can await attack, because he thinks that, although his force is so much inferior in numbers, the position he has taken up will compensate for that inferiority. He has had time to study and to improve his communications in the first place; so much so, that it enables him to bring up troops on any threatened point without suffering any very severe loss. He has also had time to study the ground in front of the position, which would warrant his manœuvring with a certain portion of his small force, with the object of delaying the enemy as long as possible. And he has had further time, also, to calculate the ranges of all points where the enemy's guns might, probably would, be placed. Now, these are very great advantages, and if properly utilised would certainly justify an officer deliberately awaiting to be attacked by a much stronger force. But Major May has explained to us that no skilful officer would be satisfied with merely acting on the defensive; he would appreciate that the counter-attack is the soul of the defence, and from the first, irrespective of the inferiority of his force, he would lay his plans for that counter-stroke, and he would dispose of his

troops so that every man, horse, and gun would be available for the supreme effort, and for the subsequent pursuit, provided that the counter-attack proved successful. Major May has not referred, I notice, in the lecture to the pursuit, but I feel sure that so close a student of military history has not overlooked the fact that victory would not be complete by a counter-attack alone, unless it was followed up by a pursuit. General Gosset has referred to the question of the splitting up of brigade divisions of artillery. No doubt, as a rule, it ought not to be so, and that is what we are now organising our artillery in brigade divisions for. But the instance given by the lecturer is a very clear proof of how necessary it is at times to adopt other tactics than those laid down in the Drill-Book, and to be prepared as the circumstances of the moment may require. You will observe, also, that Major May laid stress upon the necessity of guns, being in a defensive position, not opening fire upon small parties of cavalry, or of skirmishing bodies coming on in front. It is really well worth bearing in mind, because the longer you can keep the enemy in ignorance of the defensive arrangements, the more chances there are of his committing some error in the disposal of his troops for the attack. The only other point I need mention is with reference to the stress which Major May lays on the word "conjunction" of artillery with other arms in a defensive position. The word which Colonel Knox uses is the "combination" of artillery with other arms in a defensive position. The commander having the choice of his position ought to be able to use his three arms in co-operation, which is much more difficult in an attack, for when the position is going to be assaulted, as you may have seen, no doubt, at the very decisive moment the infantry is almost certain to mistake the fire of its own guns. That is a matter which is very difficult indeed to avoid, but you must try to get rid of the difficulty as much as you possibly can. Major May refers to junior officers being given command of their respective units, which I believe would be most advantageous. With regard to the field telegraph, it would appear most difficult for an artillery unit, like a brigade division of artillery, to be hampered with field telegraph equipment; but I think in a defensive position it would be an admirable thing for a commander to have at his disposal a field telegraph, but I do not think you could manage it with small units. Colonel Knox spoke about the use of smokeless powder; well, all I can say is, that that is really a matter of money, but I suppose we shall get it when our present supply of powder is used up. I do not think I need take up your time with any further remarks. We are all very grateful to Major May for coming amongst us to-day, and I am sure you will all wish me to convey to him our very sincere thanks, not only for the subject of his lecture, but for the very intelligent manner in which he has delivered it.

## WHAT THE "MELPOMENES" DID AT VIZIADRUG.

*By Sir NORMAN LOCKYER, K.C.B., F.R.S., etc.*

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Wednesday, April 19th, 1899.

Rear-Admiral Sir W. J. L. WHARTON, K.C.B., F.R.S. (Hydrographer  
to the Admiralty), in the Chair.

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*(The Lecture was illustrated by a number of interesting photographic slides, which, unfortunately, it has not been possible to reproduce for the Journal.)*

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IT has long been one of the glories of the British Navy that more than any other it has been employed in exploration and investigation, and in this way has done service to mankind by promoting the arts of peace. I have to deal chiefly this afternoon, not with explorations, but with the separate scientific investigations which have been carried on from time to time, and it would be most interesting, if I had time, to put before you a complete statement of the way in which the Navy, especially the surveying branch of the Navy, has assisted science in many directions for the last century and a half. It is right that I should remind you that the English Navy has not been the only one that has rendered valuable service to science. Sir William Wharton has made the world his debtor by editing, some few years ago, Captain Cook's Journal, and I need not go further back than that. One of the objects which Cook had in that memorable voyage of his in the "Endeavour" was to observe the transit of Venus over the sun's disc in 1769; but before that time the French had sent out an expedition to India to observe the eclipse of 1761, and there is a very touching episode connected with it; the scientific observer Le Gentil, when he got near Ponticherry on a French man-of-war, found it was in possession of the English; he therefore could not land, and was compelled to make his observations on board ship, and they therefore necessarily did not amount to very much. A wonderful instance of how things change is that: he found it better to remain in Ponticherry for another eight years to observe the next transit than to go back to France and stand the racket of getting back again. After that, we have the wonderful exploration of La Pérouse in those appropriately named exploring ships "Boussole" and "Astrolabe," and many of you know the disastrous result. I think it is only fair that I should point out that although the English Navy has been *facile princeps* in this kind of work, it has not been alone.



With regard to the part of the naval work which I have to refer to to-day, I should point out that since the year 1860 it has been the custom of the Admiralty from time to time to tell off ships to assist observers of eclipse expeditions, when the eclipses take place, as they generally do, in a very outlandish part of the world. We have not had a total eclipse of the sun in our islands for more than a century, and we are not going to have one again for more than a century; so that, if it is important to observe these eclipses at all, one has to go very often very far afield, right out of the ordinary track of commerce, into inhospitable lands, under such conditions that unless we get assistance from the Navy the work cannot be done. My experience extends only from the year 1870, and I can answer for it that on the several occasions on which I have been sent out by the Royal Society to observe these matters in a Queen's ship we have always received the greatest possible assistance. But until a year or two ago the ships which were told off for this duty were generally small, and the understanding was really that the ship was there more for the sake of transport facilities than for anything else. Another point is this: 20 or 30 years ago the scientific problems which had to be studied during these times were problems which required very delicate eye-observations which could only be made by those who were thoroughly accustomed to them, observations of so delicate a nature that a short drill would probably not have been sufficient to put on any additional observers. But the story is quite changed now; it is practically a loss of time to make any instrumental observations during the eclipse with the naked eye. Every branch of work has to be undertaken by means of photography, and it is from this point of view that I have attempted to make two experiments, the results of which I propose to bring before you to-day.

In order that you may see exactly the kind of work which has to be done, and the conditions under which it can be accomplished, I will endeavour to give an idea of the general phenomena which we go out to see. I take it for granted that the general conditions of an eclipse are familiar to you; that is to say, that the reason we do not see certain bright objects round the sun, any more than we see the stars in the daytime, is because that part of the sun that we ordinarily see, with its spots and so on, throws such a flood of light upon the atmosphere that each unit of the atmosphere is more luminous in consequence of this light than the things which it hides; but when the moon comes exactly between us and the sun all this light is shut off from our upper air, and then we can see both these finer solar appendages and the stars. The first phase of the eclipse is when the moon begins to appear on the disc of the sun; and this stage of the eclipse lasts for about a couple of hours. After which we have the light of the sun cut off entirely. Totality only lasts for something like two minutes, so that in that two minutes you see everything which is revealed—we shall see directly what is revealed—by this shielding of our upper air from the light of this underlying photosphere of the sun. Before the moment of second contact, that is to say, when the sun's edge and the moon's edge are nearly coincident, we find that



the light which we receive from the sun is gradually being reduced, until ultimately, when the two edges are in coincidence it is entirely cut off, so that we then have a chance of seeing these fine phenomena. The moment that stage is reached we get this halo, this so-called corona round the sun, with its prominences and with the underlying parts.

Now then, what use are we going to make of it? We have first of all to study the chemistry of everything which is revealed to us in this manner. We have not only to study it generally, but, if possible, locally, to find out what particular chemical substances exist in particular parts of the solar atmosphere. We wish, further, to determine the shape of this bright halo of light which we know changes from eclipse to eclipse and therefore from year to year, and to learn also, if we can, something about its physical, as opposed to its chemical, constitution. You can imagine, therefore, that as one has only two or three minutes to do this work in, things must be done quickly, or else one will find when the minutes are over that we have only just begun to do the work which ought to have been finished in that interval. That is the reason why, during the eclipse, not only must we be tremendously quick, but the means of that rapidity must be there to carry out the work which it is necessary to perform. One point in connection with this introduction of photography is that very much more is possible, provided you have sufficient assistance among which to divide the various detailed parts of the work; when eclipses happen far away from home, as they generally do, this means that under ordinary circumstances a considerable number of observers has to leave this country and visit the region where the eclipse is observed. Now, the amount of money which Her Majesty's Government considers it desirable to spend on science is strictly limited, so you see an advantage is introduced by the magnificent facilities which photography has placed at our disposal, provided there are assistants enough to utilise them. The object of the experiment to which I have already referred was really to see, for my own information without saying anything to anybody, whether in the future it might not be possible, seeing that probably in a great many cases observations will not be made at all if they depend upon a large number of observers leaving England, for the observations to be made by Her Majesty's ship on the station, a few packages of instruments being sent out in time from Portsmouth, Chatham, or Plymouth. The first experiment which I made was in 1896, when the Admiralty placed at the disposal of the Royal Society H.M.S. "Volage," a ship a great many times larger than any which had been placed at the disposal of an eclipse expedition before. I believe that the Admiralty was generous enough to give permission to the captain of the ship for six midshipmen to be employed, if necessary, in the observations. When on arriving at the station I saw Captain King-Hall, who was in command, he asked me how many volunteers I wanted. I said, "That depends, sir, entirely upon the completeness of the observations you wish to make." "Oh," he said, "it is a question of the observations you wish to make." I said, "My wishes depend upon yours; I have brought a great amount of apparatus, and if you find volunteers to

use it I will look after the drills, and I will see that the observations are made if the volunteers are forthcoming." To make a long story short, seventy or eighty volunteers, including all the officers and representatives of every rating in the ship, came forward; the drills were carried on for a fortnight, and I am perfectly certain that the most magnificent results would have been obtained; but, unfortunately, the eclipse was eclipsed. The morning of the eclipse gave us a terrible system of thick clouds and nothing else. So that all the efforts made by the "Volages" fell to the ground, except so far as one saw, as I told Captain King-Hall at the time, that we had there a more tremendous instrument of astronomical research than had ever been employed before. I will show you a view of the camp, so that you may see exactly what the conditions were. We were on one of those innumerable fiords branching out of the Varanger Fiord, our observatories were situated some two miles from the ship. By the time of the eclipse every one of the volunteers was perfectly drilled for the particular piece of work he had to do, all the observatories had been set up, all the instruments had been adjusted, and it had been proved to demonstration by innumerable drills and rehearsals—in fact, we lived on drills and rehearsals—that when the eclipse came, if it were good enough to show itself, we should be able to render a very good account of it. The next slide will show you the volunteers; that will give you an idea of the number of astronomers who were there in that very desolate land ready to do their work, if the sun would let them.

It so happened that in 1898 another eclipse was visible. The eclipse path passed across India, from the south-west to the north-east, and hit a very convenient harbour on the west coast, about 170 miles or so south of Bombay. The Admiralty was good enough, at the suggestion of the Royal Society, to tell off a ship in order that an observing party might be landed at that part of India to do work in relation to the line of observers which stretched right across from the Bombay Presidency almost to the Himalayas. The ship was H.M.S. "Melpomene," a second-class cruiser. We went on board the "Melpomene" at Colombo, and Captain Chisholm-Batten, her commander, put exactly the same question to me as Captain King-Hall had done two years before, and I gave him exactly the same reply. He said, "Well, if you will explain to the ship's company what is wanted I will call for volunteers, and then we will see what can be done." I did as I was told. I explained on the deck one night what was wanted, and Captain Batten called for volunteers. To my delight and astonishment, and I must say rather alarm, more than 120 officers and men at once stepped forward. Now that, of course, meant incessant school till the moment of the eclipse. However, we were all quite prepared for it. The next delightful thing I found was that three or four of the officers of the ship were just as competent to give instructions on the various lines of work to be attempted as my assistants and myself were, so that the teaching was put into a very big commission. We began our drills long before we arrived at our station. An important part of the work was to get an idea of the outlines of the corona, which you have already seen on the screen, and for that purpose I had taken

out several discs which would hide the more luminous lower parts of it in order to shield the observers' eyes, so that they would be in the best possible position to note the delicate tracings outside. In addition to that, of course we had a large party engaged in drawing the corona, so we started drawing competitions. We had marks for form and for colour of the corona, and for that purpose the ship rigged up a magic-lantern by means of one of the incandescent lights. We found a capital screen on deck in the shape of one of the casings; a drawing or photograph (coloured) of the corona was thrown on the screen and copied under eclipse conditions. I can show you one of the actual drawings then used, prepared by one of the officers. What do I mean by eclipse conditions? I mean this: experience shows that when the eclipse begins you must tell everybody how many seconds are left; if the eclipse is going to last 170 seconds, at the instant of totality we tell them so. After 10 seconds we say, "You have 160 seconds more"; after 20 seconds we tell them they have 150 seconds more; and so on, in as encouraging a way as we can. We adopted this plan in our practising. Various drawings were thus copied by the staff responsible for that part of the work over and over again before we got to our observing station.

The next thing which delighted me was, that not only was every rating in the ship represented two or three times over in the volunteers, but that almost all the men who volunteered to make these drawings had colour-boxes. Where they get them from I do not know, but colour-boxes they had. In the examination we gave 10 marks for colour and 10 for form. Several of them got 18 out of a possible 20 marks. I mention that because it gives you an idea of the thoroughness with which every part of the work was done. When we arrived at Viziadrug we landed the same day, and at once went to work to study what the local conditions of observation were; ultimately, we found a most excellent site in an old fort, which had been built by a lot of pirates many years ago. I presume the pirates of Penzance could not hold a candle to them, because it required 40 ships of the line and 8,000 men to capture the fort. Some of the old cannon-balls representing this local phase came in handy as clock-weights. I will show a photograph of our position in relation to the fort, which will give you a very good idea of the local conditions. The men were brought on shore in the early morning in order to do the drills and erect the various instruments and all sorts of other work which turned up; but we had to knock off in the middle of the day in consequence of the extreme heat. It was very convenient for us that the "Melpomene" could lie at such a short distance from the camp that it did not take more than a quarter of an hour for the various parties to get to work. A signal station was at once established, so that, as at Kiö in Lapland, we could at once communicate with the ship in case anything were wanted. A plan of the fort, which was made at once, will give you a general idea of the arrangements. You will see the rest-house or dak-bungalow on the north-west corner and the road leading to it from the Collector's encampment. The positions of the various observatories are indicated on the other side of the road. There were three walls

round the fort, and the inner wall represented here was utilised for the discs about which I have already spoken. The first thing to do was to organise the work. This was chiefly done by Captain Batten. We had a conference, and it was found that with such a large number of volunteers we could practically undertake almost every kind of work which had ever been attempted during an eclipse. The observers were next divided into 22 groups. We began with the heart of the whole concern—Time—the distribution of time signals to all the observers, because the whole effort depended upon doing the right thing at the right time, and, of course, the administration had to be responsible for giving them the right time. Then there were different instruments, prismatic cameras, integrating spectroscopes, and so on, sketches of the corona, observations of the stars, shadow-bands, meteorological and polariscopic observations, so that there were 22 different pieces of work and 22 different parties, each in charge of a responsible person. In order to show you how the ship's ratings were represented in these parties I give a list of the parties and the *personnel*.

The groups of observers were as follows :—

1. Time.
2. 6-inch prismatic camera.
3. 9-inch " "
4. Integrating spectroscope.
5. 6-inch equatorial.
6. Coronagraph.
7. Discs.
8. Sketches of corona without discs.
9. 3½-inch equatorial.
10. Observations on stars.
11. Shadow-bands.
12. Meteorological observations.
13. Hand spectroscopes.
14. Prisms for rings.
15. Polariscopes.
16. Landscape colours.
17. " cameras.
18. Shadow phenomena
19. Kinematograph for eclipse.
20. " " shadow.
21. Contact observations.
22. Observations on natives, animals, etc.

The observers were as follows :—

1. *Time Signals.*

Captain A. W. Chisholm-Batten, R.N.	F. T. Marey, Private, R.M.L.I.*
F. Downton, Leading Seaman.	G. S. Fullilove, Private,
W. Woods, Yeoman of Signals.	R.M.L.I.
W. Groves, Shipwright.	G. Cleary, Private, R.M.L.I.



2. *6-inch Prismatic Camera.*  
 Mr. Fowler. F. Brading, A.B.  
 Lieutenant O. de Wett, R.N. J. Innes, A.B.  
 C. Ironsides, G.M. G. Salt, Boy, 1st Class  
 J. Turner, T.I.
3. *9-inch Prismatic Camera.*  
 Dr. Lockyer. A. Wilkins, Shipwright.  
 Lieutenant Percival-Jones, R.N.R. E. Ashford, A.B.  
 A. Ramage, A.B. F. Fenton, A.B.  
 W. Bray, Ch. Arm. A. Carr, Boy, 1st Class.
4. *Integrating Spectroscope.*  
 Lieutenant G. C. Quayle, R.N. G. Travill, P.O., 1st Class.  
 J. Bird, Ch. E.R.A.
5. *6-inch Equatorial with Grating Spectroscope.*  
 Sir Norman Lockyer, K.C.B. P. Ross, Ch. E.R.A.  
 Professor A. Pedler, F.R.S. G. Vanstone, Ch. E.R.A.  
 Mr. R. C. Steele, Gunner, R.N. H. Brown, Ship's Steward's Boy.
6. *Coronagraph.*  
 Staff-Engineer A. Kerr, R.N. C. Moseley, Leading Stoker,  
 W. Holmes, E.R.A. 1st Class.  
 G. Collier, Stoker.
7. *Discs.*  
 { A. Ruse, Ship's Corporal, 1st Class. } R. Sutherland, Leading Signal-  
 { G. Pink, Qualified Signalman. } man.  
 { J. Henry, Boy, 1st Class. } W. Webb, A.B.  
 { B. Brook, Stoker. } W. Corney, Stoker.  
 { A. McDonald, P.O., 1st Class. } G. Price, A.B.  
 { A. Tull, Ship's Steward's Boy. } J. Jones, A.B.  
 { L. Pettingale, Leading Signalman. } F. Dibbins, Ordinary Seaman.  
 { W. Brooker, A.B. } L. Gates, A.B.  
 { S. Drew, Ordinary Seaman. } R. Davis, A.B.  
 { P. McKenna, A.B.
8. *Sketches of Corona without Discs.*  
 A. Richardson, P.O., 1st Class. T. Wells, A.B. }  
 W. Parkhurst, A.B. } General. H. Brinstead, A.B. } N.W.  
 H. Lack, Boy, 1st Class. } E. Dann } S.E.  
 W. Anderson, A.B. } W. Evans }  
 E. Wilson, Ordinary Seaman. } N.E. W. Clayton } S.W.  
 A. Penny }
9. *3½-inch Equatorial.*  
 Sir Norman Lockyer, K.C.B. M. Moore, Stoker.  
 Mr. H. Willmore, Assistant Engineer,  
 R.N.
10. *Observations on Stars.*  
 Lieutenant Henry Blackett, R.N. T. Sutton, Stoker.  
 J. McDonald, A.B. J. Fitzroy, Boy, 1st Class.  
 F. Stevens, A.B. G. Russell, Private, R.M.L.I.  
 R. Buckland, Plumber's Mate.

11. *Observations of Shadow-bands.*  
 Staff-Surgeon C. L. Nolan, R.N.      A. Purkington, 2nd S.B.  
 C. Hester, Private, R.M.L.I.      Steward.
  
12. *Meteorological Observations.*  
 Mr. John Eliot, C.I.E., F.R.S.      J. Bartlett, Stoker.  
 J. Russell, Chief Stoker.      T. McCarthy, Stoker.  
 C. Butt, Leading Stoker, 1st Class.      E. Perry, Stoker.  
 H. Rockett, Stoker.      G. Woolston, Stoker.  
 A. Wallace, Stoker.      G. Garrard, Stoker.  
 G. Pratt, Stoker.      C. Mintram, Stoker.  
 H. Wallburn, Stoker.      P. Keefe, P.O., 1st Class.
  
13. *Hand Spectroscope.*  
 Lieutenant C. E. B. Colbeck, R.N.      P. Manning, Ordinary Seaman.  
 C. Kitchingham, Private, R.M.L.I.      H. Mitchell, Stoker.  
 C. Woodley, P.O., 1st Class.      J. Dobson, Sergeant, R.M.L.I.
  
14. *Prisms for Observations of Ring Spectra.*  
 Mr. J. Mountifield, Senior Engineer, R.N.      R. Coates, Stoker.  
 W. Morris, E.R.A.      G. Tarrant, Stoker.  
 A. Howe, E.R.A.      H. Warren, Stoker.  
 C. Stacey, Leading Stoker, 2nd Class.      J. Inch, Stoker.  
 H. Knight, Leading Stoker, 2nd Class.      G. Gray, Chief Stoker.  
    J. Cross, Stoker.
  
15. *Polariscope.*  
 Staff-Surgeon C. L. Nolan, R.N.
  
16. *Landscape Colours.*  
 Lieutenant E. N. R. Dugmore, R.N.      P. Darvil, Boy, 1st Class.  
 G. Farrell, Boy, 1st Class.      H. Rhodes, Ordinary Seaman.  
 W. Jacobs, A.B.      H. Attree, Signalman.
  
17. *Landscape Cameras.*  
 Mr. Turner, Survey Department, Calcutta.      J. Collins, Chief Stoker.  
 E. Gynge, A.B.      J. Kearney, Leading Stoker,  
    1st class.  
 H. Childs, Chief Stoker.      E. Cross, Leading Stoker, 2nd  
    Class.
  
18. *Shadow Phenomena.*  
 W. Keenan, Chief Carpenter's Mate.      G. Riley, Stoker.  
 A. Reynolds, Stoker.      B. Crunden, Stoker.  
 W. Weeks, Shipwright.      C. Carpenter, Stoker.
  
19. *Kinematograph for Eclipse.*  
 The Marquis of Graham.      C. Thomas, Seedie.  
 A. Shilcock, E.R.A.      P. King, Ordinary Seaman.  
 E. Green, Boy, 1st Class.      W. Cronen, Stoker.
  
20. *Kinematograph for Shadow.*  
 Mr. H. P. Barnett, Paymaster, R.N.      A. Gidney, E.R.A.

21. *Contact Observations.*

Lieutenant O. de Wet, R.N.

C. Ironsides, G.M.

22. *Observations on Natives, Animals, etc.*

W. J. C. Slocombe, Ordinary Seaman. F. Beal, Ordinary Seaman.

G. Whittingstall, Ordinary Seaman.

Aides-de-Camp to Sir Norman Lockyer, K.C.B., F.R.S.

Mr. W. H. P. Bourne, Midshipman; J. Hunt, P.O., 2nd Class.  
R.N.

You will understand that it did not take us long, under these circumstances, to put up the instruments. In a week, within a day or two, every instrument was set up and adjusted. I should tell you that we landsmen were most interested in the fact that no sooner was an instrument put up than it got a name: one was Mainsail Hall, and another the Central Hotel, the whole fort was named Batten's Camp, and the wall on which the discs were placed was called the "Common Hard"—the ship hailed from Portsmouth—and so on. In three or four days there was not a place which had not a name, and a very good name too. I will now endeavour to give you an idea of the arrangements.

I will first deal with the question of time, which is the fundamental one. Here is the headquarter staff at the eclipse clock, under Captain Batten. In an eclipse, especially when you have so many observers as we had on this occasion, it is fundamental that every observer shall know that he will get a good square look at it at some time or other. In early eclipse work this was not recognised, and I never felt more annoyed in my life than, when I was in India, in 1871, I found that in consequence of my ignorance of eclipse organisation, Captain Bailey, of the Royal Engineers, who travelled 400 miles to our camp to help us, did not see the eclipse at all. He volunteered to give us the time, and took to rehearsing the work daily. I said to him, "What you have to do is to put your chronometer on the table and then sit down facing the sun, so that at any time you like during the eclipse you can look off the face of the chronometer and see the eclipse, because now you have come so far it won't do for you to go away without seeing anything." He said, "Well, I have been practising for the last two days, and I find it very difficult." I said, "What are you going to do about it?" He replied, "Well, I shall go on practising it till I do it." But to my horror, just before the eclipse began, I saw him take his chair to the other side of the table, deliberately place his back to the sun and look at the chronometer, and he never saw the eclipse at all. I was determined that that should never happen again in any eclipse that I had anything to do with, and since then I have always doubled the timekeepers, and given one-half of the eclipse to one timekeeper and the other half to another. In the next slide you will see exactly how the thing was managed. We have the "eclipse clock" which is started by cutting a thread at the word "go," which means the beginning of the eclipse. Then one of the timekeepers turns his back to the sun, stands in front of the clock, and reads out the time-signals 120 seconds left, and so on, which are marked on

the dial, while the other is looking at the eclipse. The half-time signal, 60 seconds on this occasion, is sung out by both, and then they right-about-face, one man going off duty and the other taking it up. In that way both see the eclipse. The hand of the clock is made to move along a spiral on which the times are marked, so that there can be absolutely no mistake made as to the time. Not only can the even seconds be given in that way, but if at any particular time it is requisite for any particular operation in any of the observatories, the time-signalman can give that time as well, so that all the operations are kept perfectly steady. I will next show you a snapshot which was (very disrespectfully) taken of Captain Batten in one of our rehearsals, and you will see exactly how the thing was done. In order to give you an idea of the importance of keeping the time during an eclipse, I will read you a portion from Captain Batten's report, for I am glad to say that we have already got the reports of the twenty-two naval parties employed, and I hope they will soon be published by the Royal Society.

At 11 o'clock the "Thermometer" party commenced work.

11.12 a.m.—The "first contact" took place.

12.16 p.m.—"Naturalists and Landscape" party commenced operations and were followed at

12.30 p.m. by the "Slit Spectroscope and Prism" parties.

Ten minutes before "totality" Lieutenant de Wet, with an Admiralty chronometer "gave the word," on which the "alert" was sounded on the bugle.

At this signal—

The "stops" were taken off telescopes.

Caps off siderostat and cœlostat.

Clocks wound up.

Timekeepers reported eclipse clock correct, and all the above were reported to me.

Observers at discs blindfolded.

Remainder of observers turned backs to sun.

3 "G's" were sounded on bugle at seven minutes before "totality" as a signal to Professor Pedlar with 6-inch.

25 seconds before "totality"—90° from Lieutenant de Wet.

2 "G's" on bugle.

5 seconds before "totality"—45° from Lieutenant de Wet.

1 "G" on bugle.

On the order "go" the first timekeeper, with his back to the sun, called out "127 seconds," and every 10 seconds till 17 seconds, when 10 seconds was called, also 7 seconds, and then every consecutive second till "Over" was given.

Why it was necessary to use the bugle you will see at once. That was the order given to the various parties, several of whom were a long distance from us, especially the disc observers. At the "alert" the stops were taken off the telescopes, a very wise precaution, for in some eclipses the caps have not been taken off at all—there were other things to think of! All the clocks were wound, and the observers at the discs



were blindfolded. Then all the observers turned their backs to the sun in order that they might not weary their eyes by trying to see a series of phenomena of no interest to anybody. At 25 seconds before totality we had two "G's" sounded on the bugle. It had been determined that at that moment the uncovered arc of the sun measured exactly  $90^\circ$ . It was most important for the spectroscopic work that we should get the signal 5 seconds before totality—that is to say, 5 real seconds before totality quite independent of any errors in the Nautical Almanac. Captain Batten did a thing which has certainly never been done in any eclipse expedition before. We expected, of course, a very definite shadow, and he was good enough to find a native dhow and charter it, and anchor it in the roadstead at such a distance that the shadow would strike it exactly 5 seconds before it struck the camp. That effort failed because practically there was no shadow, there was too much light from the corona, and the air was too clear. But we did get 5 seconds absolutely and perfectly from Lieutenant de Wet, who found that at that period before totality the portion of the sun still visible would subtend an angle of  $45^\circ$ . The moment of totality had to be determined by means of the  $3\frac{3}{4}$ -inch.

Now I will show you one or two groups of observers in order that you may see the importance of the work done by the Navy. I will begin with one of the prismatic cameras. What the prismatic camera had to do was to take a considerable number of photographs during the eclipse, which lasted about 2 minutes, and also for 5 seconds before and 5 seconds after. It was necessary to mount it in this way and to throw the sunlight into it by means of a mirror of a siderostat. That was done by one of the observers, obeying the time-signal, by raising the cover in front of the objective prism. The instrument is kept in adjustment by still another assistant, the plates are handed to an exposurist and then stored away, and two men are required to take the time. Without that *personnel* of seven the work could not be done.

The next slide will show you what the result actually was. There was a series of 10 snapshots taken at the beginning of totality, and another 10 taken at the end of totality, and shots of different periods, up to 36 seconds in one case, taken during the totality itself. That was done, of course, in the hope that one exposure would be better than any of the others, so that we should be sure of getting something at its best. Another reason was that we hope to get records of fainter phenomena in the middle of totality than we were likely to do at the beginning and end of it. That will give you a general idea of the work of one of these most important instruments.

The kind of thing which was photographed, the series of hieroglyphics obtained by means of this work, you will see from the next slide. It was taken at the beginning of totality. We have to determine the exact wavelengths of these so-called lines or arcs, which are really images of the arc and of the sun's atmosphere just visible over the dark moon painted in lines of different colours, depending upon their refrangibility. If we can determine their exact positions, we know their chemical origin; so that when

we get an arc like that, very much longer than the other, we know that the particular chemical substance which builds up that arc extends to a much greater height in the solar atmosphere than another substance which is only capable of giving us a very small arc, such as *this*. The 6-inch prismatic camera was very much like the one previously shown, so I will not call your attention to it further. But I should like to show you the coronagraph, which was entirely in charge of the staff engineer and his engine-room staff. We made no attempt to obtain any very fine photographs of the eclipse, because we knew that the Indian observers would do that, and in fact they did provide a very admirable series. But it was necessary to get some photographs which would give us the relationship between the different parts of the corona which we saw, and those which were photographed by means of those other instruments. I will next show you the two photographs which the engine-room staff of the "Melpomene" gave us; they are as good as any of the photographs which were taken during that eclipse; they are not on such a large scale, but you see they are very admirable in their details; that was from an exposure of 5 seconds; here is a snapshot where you get the lower corona, and you will see there is plenty of detail in it. So that that coronagraph was really a very great success. The grating spectroscope, which was in charge of Mr. Steele, the gunner, under Professor Pedler, also did excellent work.

I will pass from the larger instruments and come to the star observations. These observations were entirely in charge of Lieutenant Blackett, and what he did every night before the eclipse was to get his staff of seven or eight to observe certain groups of stars from the deck of the ship or from the shore, and determine their magnitudes as well as they could, and make maps of them. It was perfectly wonderful how, after three or four nights, they could make a map of the constellation of Orion, not going very far wrong. That stood us in very good stead during the eclipse. I will show you one of the maps in which Lieutenant Blackett gave us not only his own observations, but the observations made by others. It is very remarkable to see the results which they got out. Not only was an apparently new body seen in a place where no star has been recorded, but the remarkable fact was noted that the stars came out and went in again. That shows you the wonderful honesty of the observations, because although that fact has been noticed before—it was seen by Admiral Don Ulloa in the last century—nothing was said to them about it; the fact is undoubted, because it was logged not only by Lieutenant Blackett but by several of those who were observing. These maps were supplied to us by the Indian Trigonometrical Survey Office, and every observer had one given to him, so that they made their observations under excellent conditions. With regard to the drawings of the corona we found very considerable similarity, showing that the drill had done an immense deal of good, but the form of the corona was so very definite and had been so uncommonly well caught by Staff-Engineer Kerr in his photographs that we did not think it necessary that those drawings should be published. Some of the disc drawings are certainly very interesting

indeed. We had the discs arranged so that some of them are larger than others. Here is a drawing made by G. Price, A.B., showing the portion of the corona beyond the disc erected on the wall. A comparison of these discs will no doubt give us some points of considerable interest.

Staff-Surgeon C. L. Nolan made a very admirable study of shadow-bands; I believe they are the finest observations of shadow-bands which have ever been made. All I told him was that he had to do them in three dimensional space, getting two walls at right angles to each other for choice, and see what he could see. This is one of the results which he found. The width of space between the bands was from 1 to 6 inches at the first appearance. He noted the velocity as between 4 and 6 miles an hour in the direction of N.  $88^{\circ}$  W. All these are facts of extreme value to science. The staff-surgeon was assisted by two marines. His report is not only of great value but of considerable length, so that a great deal of observation was made in a very short time.

I am afraid I have not time to say anything about the other groups of observers, because there was such a considerable number of them; but I cannot help mentioning that the spectroscopic work, which was in charge of Lieutenant Colbeck and Senior Engineer Mountifield, turns out to be exceedingly interesting. I took out several spare prisms and spectroscopes with me in the hope they would be of service and they were used to the very great advantage of science.

I will show you the general group of observers after the eclipse. You will see we have a much larger group than we had in 1896. This photograph includes some 10 or 12 men who were not volunteers, but who were there helping us with lamps, in case lamps should be needed; but as a matter of fact, no lamps *were* needed.

I have said as little as possible of the astronomical side, because I was informed that what you would be chiefly interested in was the question of Captain Batten's administration of the eclipse expedition. Perhaps it may be desirable that I should point out that this "Melpomene" expedition turns out to be one of the most valuable expeditions which there have ever been; in fact, I do not think that any single party has ever advanced knowledge to such an extent as the "Melpomene" party did in 1898.

The statement has been made that the bright lines seen during an eclipse in the lower part of the sun's atmosphere exactly match the dark lines, called the Fraunhofer lines, in the spectrum of the sun. From the point of view of this eclipse it was a question of comparing the photograph of the sun and the photograph of the sun's lower atmosphere obtained by the same instrument, one during the eclipse and the other outside the eclipse. Those two photographs are now side by side. There is no necessity to make any statement as to whether there is or is not coincidence, because you can see that there is very little coincidence between the bright lines in the one case and the dark lines in the other. It becomes a question of mere inspection of documents, which cannot err; it depends upon no man's opinion, it depends on no man's authority. It is impossible to over-estimate the value of this work,

because the general idea has been that the sun's atmosphere really produces these lines, and that the particular part of the sun's atmosphere which does that is the particular atmosphere which is close to the sun. Now we see that is not true.

The next point has to do with the unknown gas called coronium, which exists in the higher reaches of the sun's atmosphere. So far one knows nothing about it; it has never been obtained here, and possibly for the reason which the "Melpomene" expedition has explained. The statement has been made many times during the last 30 years that the bright line of the corona is coincident with the line the position of which has been assigned by Kirchhoff as 1474. By comparing the photograph of the sun and the photograph of the lower reach of the sun's atmosphere and of the higher reach we now are certain that that is not so. We can see that the comparison is fairly made by noting the exact coincidence of the same line where it exists in all these photographs—there is the hydrogen line which is properly adjusted there, and here is another line called D3, and another D, both of which are properly adjusted. Then it becomes a question of seeing whether the corona line does or does not coincide with the line in the assigned position, and you see it does not. There again we have destroyed an error which has been writ very large in all our text-books for the last 30 years.

But we have gone a great deal further than that. If we take this same record of the lower reach of the sun's atmosphere we can compare it not only with dark lines of the spectrum of the sun but with the dark lines in other suns; that is to say, we are beginning to discover and classify the dark absorption lines in stars in the most remote regions of space.

Here is the bright line spectrum seen in the lower region of the sun's atmosphere, underneath is the dark system of lines in the sun's atmosphere with which we have already seen there is very slight coincidence. Lower still is a photograph of the spectrum of  $\gamma$  Cygni, and you see there we have a most wonderful coincidence, in fact it is almost a question of line for line, and that explains to us how it is that this lower region of the sun does not correspond with the Fraunhofer lines. It tells us the absorption region of the solar atmosphere lies at a higher level than that occupied by these lower, more highly heated gases, and that the reason these highly heated gases do correspond with the absorption lines in this star  $\gamma$  Cygni is because  $\gamma$  Cygni is hotter than the sun. So we have started now a stellar thermometry, and from that Rosetta stone, as it really is, it will be very easy for those who follow us to lay down the stars in the order of their relative temperatures, both up and down.

Although those are results in the region of pure science, I think you will acknowledge they are results which it is very important for the "Melpomenes" and those connected with them to have arrived at. Their value is absolutely beyond all question. They open up an enormous field for investigation, which will occupy workers at other times besides eclipses. Now I have shown you some of the results obtained, I



can repeat the statement that in no prior eclipse have more important questions been settled than in the eclipse of 1898, by the Viziadrug party. In my report to the Royal Society I said I did not think it would be proper for me to thank the "Melpomenes" for their help, because we really had helped the "Melpomenes"; it was they who did the work and we who helped them. I think that that is the true method which must be utilised in future in relation to the point of view which I have already brought before you, viz., the possible difficulty in sending out a large number of observers. It must be remembered, also, that very few people at home have studied the sun, so that if you send out a large number of observers they will not be more capable of doing the work than the men who were drilled in this way to do the work in the "Melpomene." I am delighted that all eclipse records have been broken in this way, because I see in that fact an entire justification of the experiment to which I have referred.

Now there is an eclipse next year, and my gratitude to the "Melpomenes" is partly that gratitude which has been defined as a lively appreciation of favours to come. I hope that the Admiralty will be good enough next year to send out something as big as the "Melpomenes"—bigger if they like, the bigger the better—and that the officers and men of that ship may base their action upon what has now been done twice to the complete satisfaction of everybody concerned. Perhaps I might mention one thing. Captain Batten, in parting with me, said there had not been a single punishment for six weeks on his ship. I can quite understand that the new work and the new range of thought, on a ship on a distant tropical station, going about on the wearisome grind from port to port, would be likely to give them a considerable amount of interest and make them determined not to do anything to prevent their enjoyment of it. I think also from the officers' point of view such work is of value; naval officers are men of science, and in any branch of science it is always a good thing to have a little more science up your sleeve than that bit of it with which you have to occupy yourself every day. So I think from the naval point of view there can be no very great objection urged, while from the astronomical point of view I look upon this kind of thing in the future as the best possible solution of a difficulty which is certain to arise, because I am thankful to say that the interest in these enquiries is extending from year to year. And although some eclipses have been missed in the last twenty years, I think a still smaller number will be missed in the next twenty.

Vice-Admiral Sir NATHANIEL BOWDEN-SMITH, K.C.B.:—I came here entirely unprepared to speak on this occasion, but being called upon by the Chairman to say something, I should like to express the thanks of the Institution to Sir Norman Lockyer for the honour he has done us by giving his illustrated lecture, which has been most interesting. We naval officers also are much obliged to him for what he has said with regard to the assistance he received from the officers and men of the "Melpomene." I can quite understand that they all took an interest in the work, and that it must have been an agreeable change to them in place of their ordinary routine and drills, resulting, as Sir Norman Lockyer tells us, in the punishment returns for the six weeks being blank. I know from experience that any work of

that sort, out of the usual routine, does conduce to the happiness and contentment of all on board, and usually enables one to get on without punishment. After a hard day's coaling, when the men have been working hard from the first thing in the morning to the last thing at night they will retire to rest in a happier frame of mind than they would if merely engaged in ordinary routine work, and will frequently close the evening with songs on the fore-castle before turning in. Sir Norman Lockyer has spoken of the anxiety felt by astronomers lest, after making all preparations for observing some celestial phenomenon, the weather should prove unfavourable and clouds prevent any observations being taken. This was the case, I believe, at several of the stations chosen for the observation of the last transit of Venus in 1882; but I was fortunate on that occasion, though I had, unfortunately, nothing to do with any scientific expedition. I was at Monte Video at the time, on the south-east coast of America, and watching to see if I could notice anything of the transit. The early morning was very unfavourable, however, and the sun entirely obscured by clouds, but about eight o'clock the sky cleared, when I observed Venus on the sun, and the officers of the "Amethyst" and myself watched it crossing the sun's disc with interest, knowing full well that none of us would ever have the opportunity of seeing it again. I wish there had been a larger audience here to-day to hear Sir Norman Lockyer's paper and see his photographs, but I feel sure it will be read with interest by many naval officers in many different parts of the world.

The CHAIRMAN (Rear-Admiral Sir William Wharton) :—The lecture is, of course, not one for discussion. We came here to hear what use Sir Norman Lockyer had been able to make of the means he had at his disposal in the shape of a man-of-war, and I think to a naval officer the first feeling must be that of intense satisfaction at the way in which the officers and crew rose to the occasion. We are none of us astonished that the whole of those who felt themselves in any way capable would volunteer, but we are glad they were able to do their duties so well. But there, I think, Sir Norman Lockyer has considerably minimised his own share in the transaction, because there can be no doubt that without a very great deal of excellent organisation those men would not have been able to afford such efficient aid. But for Sir Norman Lockyer's powers of organisation, and his knowledge of what bluejackets can do (because he has been on a great many expeditions in a great many ships) the expedition could not have been so successful. Also, if it had been twenty or thirty years ago I do not think he would have been able to get the men to do what these bluejackets have done. The education of our bluejackets has so enormously increased in late years that one is able to make use of them in directions which one could not possibly do thirty years ago. I do not think any opportunity has been lost lately through stinginess on the part of the Admiralty in giving ships for eclipse work, and I should hope that for the future every time there is an eclipse to be observed such means will be given. There is an eclipse next year, and one can only hope that the clouds will be as kind as they were this year, because, as Sir Norman Lockyer has said, it is a most unsatisfactory thing to go a very great distance and take an enormous amount of trouble all for nothing. I was on one total eclipse expedition myself, and we took forty-five astronomers out to the coast of Algeria in the middle of the winter. These gentlemen had all given up their Christmas to observe this total eclipse. Sir Erasmus Ommanney, whom I see before me, was one of the party. Nobody saw anything. We landed them at various places—Cadiz and Gibraltar—and we were ourselves at Oran, but we never saw anything. It was a very stormy, rainy day. We carried back to England a very unhappy and dissatisfied ship's company, I can assure you; and when the "Urgent" was fighting her way home across the Bay of Biscay against a head wind, I do not suppose a ship was ever so much abused as she was. I do not think there is anything to be done but to thank Sir Norman

Lockyer most heartily for giving us this most interesting lecture, which, anything is required in that direction, will aid in facilitating such assistance being given in future eclipse expeditions.

Sir NORMAN LOCKYER:—I thank you very much for the way you have responded to the proposal made by our distinguished Chairman. The words he has uttered are quite sufficient reward for me, not only for to-day, but if it had been a question of giving a longer lecture to a larger audience.

## THE RED CROSS SOCIETY AT SEA.

A PUBLIC LECTURE GIVEN IN ST. PETERSBURG ON THE 1ST/13TH OF  
FEBRUARY, 1899.

*By BARON BUXHOEVDEN, Lieutenant of the Russian  
Imperial Guard Marines.*

BY way of introduction, I shall say the few following words. Convinced by the history of the Red Cross Society of the facility with which a recognition of the International Convention of 1868 could be obtained, and judging that the approaching International Conference would be an opportune moment for that purpose, I sent a proposal to our Foreign Office (St. Petersburg), requesting that the question should be raised during the Conference. Besides that, being anxious to prove to societies at large how easily a settlement could be obtained, I resolved to give a public lecture on the subject.

A week previous to my lecture, the Foreign Office published a programme of the questions to be debated at the International Conference, and, amongst others, that of the Convention of 1868. The importance and significance of the lecture have been considerably diminished by this publication; but the general interest which the subject must awaken has made me still resolve to give it.

The object of my lecture is to point out the strangeness of the fact that the aid of the Red Cross Society is confined solely to the Army, and that the Navy is excluded from its beneficent offices. I have been impelled to moot this question by the approaching War Conference, at which, according to a recently published programme, one of the questions to be debated is that of the lessening of the horrors of war.

It is characteristic of our age, that, with the perfection attained by science in the means of destroying the human race, the apostle of peace keeps pace, and spreads his doctrine for the prevention of war. Humanity and philanthropy, without losing themselves in impracticable dreams, strive to find the means of weakening the disastrous consequences of war, and of lessening the number of its victims. Solicitude for the fate of the victims of war is not proper to our age, although to it belongs the honour of developing the question. Societies for the aid of wounded soldiers on the field of battle have existed in all ages, and the foundation of a regular institution was laid by the Order of St. John of Jerusalem. In Spain and Germany honourable societies of that same order have existed and still exist, but those most deserving of our esteem are the



Sisters of Mercy who laboured during the war in the Crimea and endured all the hardships of the siege of Sevastopol. In spite of the success obtained by this and other societies in their field, they suffered from a want of harmony, *i.e.*, each of them carried on its work in its own way, with its own special organisation and regulations.

The Red Cross Society of our day owes its strength chiefly to it being universally acknowledged as a holy institution, and to its being everywhere subject to the same rules and regulations. It owes its existence to a private individual, Dr. Dunant, of Geneva, an actual eyewitness of the battle of Solferino, and the author of a work entitled, "Souvenirs de Solferino," in which he describes in the darkest colours the terrible condition of the wounded who suffered less from their wounds than from the want of timely medical assistance. Thanks to his eloquent account, as well as to the trouble taken by the Benevolent Society of Geneva, Société d'utilité publique, directed by the President Gustave Moynier, an International Congress met at Geneva in 1863, which worked out the famous Convention of 1864.

Since then, the organisation of the Red Cross Society has been such as to free from anxiety all sufferers in time of war *on land*, and to assure the fate of the wounded. Would it not be simple justice were sailors to demand that the aid of the Red Cross Society should be extended to the Navy as well as the Army?

During the thirty-five years that this beneficent society has existed, nothing of the sort has been done, although war at sea cannot be considered less dangerous than on land—rather the reverse. The victims of war on land are the dead and wounded. At sea, we have not only the enemy to contend with, but the elements—even stronger than ourselves—as well. Besides the dead and wounded, there are the drowned, the number of which greatly exceeds that of other victims. The wounded soldiers are tended both by Government and by private individuals, but consideration for the victims of a sea fight is rare and always accidental. If the practical application of the aid of the Red Cross Society at sea seems to be a perfectly new and unprecedented problem, the question is, nevertheless, far from being a new one; at one time it was on the point of being realised, but failed owing to an unfortunate combination of circumstances.

When in the year 1864 the representatives of sixteen Governments assembled at Geneva for the purpose of making out the famous Convention, even then the idea was started of extending the range of the Red Cross activity on sea as well as on land; but, as the majority of the representatives refused to lend their support to the movement on the plea that it exceeded their instructions, the subject was dropped for the time being.

The war between Austria and Italy, which broke out two years later, gave a powerful example of the boon that the Red Cross Society was to the troops, and of the harm that was caused to the Navy by its absence during the naval engagement at Lissa, when the Italian fleet was

destroyed by the Austrians. From heartrending examples, let us choose the most illustrative:—

When the battle was at its height, the Austrian battle-ship the "Grand-Duke Ferdinand Max," with the commander of the fleet, Admiral Tegethoff, on board, determined to ram the "Rè d' Italia." The manœuvre was brilliantly executed, and although going at a rate of 11 knots an hour, she drove her ram through the "Rè d' Italia," making a breach of 62 square feet. It was a fearful moment—the frigate reeled to the right, righted itself for a moment, then rolling over on its left side, sank almost immediately to the bottom. The scene was terrible. In one instant the terrific sounds of battle were hushed, whilst all eyes were riveted on the doomed frigate, when, suddenly a loud "hurrah!" burst from the decks of the Austrian vessel, and the battle was renewed with its former ardour. In three minutes the "Rè d' Italia" had disappeared, and there, where it had sunk, hundreds of men were struggling for life in the water shrieking for help.

Admiral Tegethoff was the first to think of giving assistance; he at once ordered boats to be lowered; but, unfortunately, there was only one on board fit to be used, and before even that one could be lowered the "Ferdinand Max" caught sight of an Italian man-of-war bearing down upon them, so that Admiral Tegethoff had no alternative but to leave the drowning men to their fate. The Austrian frigate the "Elizabeth," and two screw schooners, likewise endeavoured to save the crew of the "Rè d' Italia." Lieutenant Franz Spindler writes as follows:—

"I saw before me some 300 Italians clinging to a couple of masts and some wooden spars, shrieking 'pietà.' I stopped the engines to avoid crushing the unfortunates to death, and ordered the boats to be lowered; but before the order could be obeyed, a perfect shower of bullets was rained upon us from the enemy's men of-war, which struck down the drowning men without injuring us. In short, not only did the Italians make no attempt to assist their fellow-countrymen, but they contributed to their destruction and prevented the Austrians from helping them."

Besides the "Rè d' Italia," an Italian frigate, the "Palestro," was blown up, the crew of which was also lost. The report of the commander-in-chief of the Italian fleet, Admiral Persano, indicates that out of the crew of the "Rè d' Italia" 400 men were lost, and of that of the "Palestro" 200.

It naturally occurs to me to inquire if the loss of these 600 men was of any use. Seemingly not, since the Austrians lent all their efforts to save them.

The actual difference between war on sea and on land is in this:—The aim of the Army is not only to win the battle, but to disable as many of the enemy's troops as possible, whether by killing, wounding, or by taking prisoners of war. This must be effected in order to prevent the troops which have been dispersed to-day, from rallying to-morrow and repairing yesterday's defeat.

A sea fight is altogether different. The aim of the combatants is to sink the *vessel*, as the crew in itself is harmless. This principle of naval war has existed from time immemorial, and even the ancient Egyptians recorded on their monuments the fact that they had saved their drowning enemies. These were the times of long ago, the days of Theocritus, when sea fights depended upon heavily armed men, when ships boarded ships, and man struggled with man in hand-to-hand fight, so that they were more like land battles than they are now; but since artillery has been brought on board our war-ships, the character of Navies has completely changed. *Ships* directed by men, but not the men themselves, wage war with each other. The crew of a sunken vessel, even the crews of a whole squadron, are no longer a danger for the enemy, and the latter even takes measures to rescue them.

Besides the battle of Lissa, the history of the nineteenth century offers many examples of the truth of this remark, of which we may take as an illustration the conduct of Nelson at the battle of the Nile. When it was clearly established that the French fleet lying at anchor was doomed, Nelson used all possible means to save the bulk of the French crews left on board the burning vessels. A more recent example is the treatment of the cruiser "Alabama" by the "Kearsarge." It is known that after a brief but brilliant career the former was challenged by the "Kearsarge" at Cherbourg to single combat, where after a short engagement she was sunk by the enemy. As soon as the commander of the "Kearsarge" saw that the "Alabama" was lost, he at once ordered boats to be lowered, and did everything in his power to save the drowning crew, part of which, with its commander, was saved by the yacht "Deerhound," the private property of an English lord, who had been a looker-on during the engagement. From these examples we may conclude that the rescue of the drowning crew does no harm to the enemy, and the part which the "Deerhound" took in the affair proves that the presence of neutral ships is not only permissible but desirable.

How invaluable the presence of a similar vessel would have been at the battle of Lissa, where the crew of the "Rè d'Italia" struggled for life so long! The "Palestro" blew up one hour after the fire broke out on board. Altogether, as I mentioned before, this battle showed very clearly the defects of the Geneva Convention in limiting its field of action to dry land. Admiral Tegethoff, after having been personally convinced of the mistake, was the first to speak of the necessity of revising and enlarging the Convention of 1864.

In 1867, the Prussian War Office raised the same question and entrusted the revision of the plans to General Langenbeck, at the very time that the Emperor Napoleon III. had proposed that the International Commission should meet at Paris for the same purpose.

In August, 1868, the President of the Swiss Confederacy, Debbs, invited the foreign Powers to take part in an International Conference which he proposed to assemble at Geneva in October of the same year. On that occasion, fourteen Powers (North German Alliance, Austria, Baden, Bavaria, Belgium, Denmark, France, England, the Netherlands,

Switzerland, Sweden, Italy, Turkey, and Wurtemberg) responded to the call and were represented by their delegates.

General Dufour, who has been elected President of the Society, proposed to form a separate committee of naval officers, which should make out a section referring to questions of naval war. This Committee was composed of Rear-Admiral Yelverton (an Englishman), Captain Köhler (a Prussian), Admiral Coupevent des Bois (a Frenchman), Captain Cottrani (an Italian), and Vice-Admiral Karrebeck (a Dutchman).

Two weeks after the opening of the meeting, the work was completed. The Conference had left the Convention of 1867 intact, and, accordingly, General Dufour's report was enlarged by a project of fifteen supplementary articles, which seemed to be merely a repetition of what had been decided by the International Commission (in Paris) of 1867. Ten out of the last fifteen paragraphs treat of naval questions, and are as follows:—

*Section 6.*—If any vessel during or after a battle should save the life of a drowning or wounded sailor it will be entitled to the rights of neutrality, so far as is consistent with the conditions of the battle and position of the vessel. The arbitrament of the terms is to be submitted to the feelings of humanity of the combatants. The rescue of the drowning and wounded deprives them of their right of continuing their service until the conclusion of the war.

*Section 7.*—The clergy, doctors, and infirmiry servants on board vessels taken as war prizes are always to be considered neutral.

*Section 8.*—These persons shall continue to perform their functions in the discharge of their duties even after being made prisoners of war on board vessels, and shall be sent back to their countries when their services are no longer required.

*Section 9.*—Military hospital-ships taken as war prizes become the property of the victor, who has not the right of changing its original purposes during the continuation of the war.

*Section 10.*—Merchant-ships of all nations are to be considered neutral if they are specially destined to the use of the sick and wounded. The visit of the enemy on board such vessels deprives these sick and wounded persons of their right of service during the war. The combatants may at any time forbid such movements on the part of the neutral ships as are considered injurious to their operations. In extreme cases, the commander may according to temporary arrangements for temporary neutrality, employ any vessel for the purpose of transporting the sick and wounded.

*Section 11.*—The sick and wounded sailors taken prisoners of war shall have the benefit of the medical assistance of the enemy.

*Section 12.*—A white flag with a red cross hoisted together with the national colours indicate the neutrality of the vessel. The enemy have the right of investigation. Military hospital-ships must be painted white with a green stripe.



*Section 13.*—Hospital-ships, which have been constructed at the expense of benevolent societies, with their crews, shall be considered neutral if they be furnished by their Governments with the necessary documents. Unlike military hospital-ships, they are to be painted white with a red stripe. These are to render assistance to the wounded, and to rescue the drowning without regard to nationality. The combatants are at all times at liberty to control, and even to direct their evolution. The wounded and drowning that have been rescued by these vessels are deprived of their right to serve during the continuation of the war.

*Section 17.*—Any well-grounded suspicion of the combatants that the enemy is guilty of an abuse of the terms of neutrality permits them to interrupt the carrying out of the Convention until these suspicions have been allayed; if the suspicions prove to be correct, the fraudulent vessel is deprived of its right of protection until the war is over.

Three days after the project of these articles was signed, the Swiss Confederacy forwarded a copy of it to each of the Governments which had recognised the Convention of 1864, accompanied by a circular requesting them to enforce it. As no notice was taken of this circular, in December a second note was forwarded, and with the same result. Finally, in April, 1869, a third note was sent by the Swiss Confederacy, and only then the answers were given. France declared that she agreed in principle with the proposed project, but wished to change *Section 9*. Her Government wrote as follows:—In time of war, not only the crews of the vessels which have been converted by their Governments into hospital-ships, should enjoy the privileges of the laws of neutrality, but the vessels themselves should have the same privilege, provided they are fitted up in such a way as to carry out only their assigned purpose. France agreed with the following announcement collectively with England. The Imperial Government understand the meaning of *Section 10* in such a manner that it should give the Government of the besieged the right of negotiating with the besiegers in order to remove the sick and wounded to the blockaded port, and that the entering and leaving of that port by the vessel intrusted with the transport of the sick and wounded cannot take place without preliminary negotiations.

France and England are willing to recognise the supplementary articles, provided these demands be respected with regard to *Sections 9 and 10*. Italy shared the previous opinion of these two countries and gave further proof of her interest by fitting up during the Franco-Prussian War a military hospital-ship which, however was not made use of, as the Navies of the two belligerents were not brought into requisition.

The Geneva Convention of 1868 was recognised officially for the first time that same year by the King of Prussia in his speech from the throne at the opening of the Landtag. Queen Augusta of Prussia used all her influence in vain towards the additional projects being carried into effect, and corresponded for long for this purpose with the President of the Committee of the Red Cross Society in Berlin.

Towards the middle of the year 1870 the state of affairs was as follows:—The North German Confederation, Austria, Baden, Belgium,

Italy, the Netherlands, Norway, Sweden, Turkey, and Wurtemberg shared the opinion of France and England with regard to *Sections 9 and 10*, but expressed their approval of the other additional paragraphs contained in the treaty. Spain gave no answer to the Swiss Confederacy, and Russia proposed making several additions to *Section 17* regarding the possible abuse of the Red Cross flag. Besides these obstacles, if they may be so called, there arose a difficulty concerning the form in which the new project was to be clothed. Incredible as it may appear, this trifling detail has been sufficient for the Geneva Convention, which had been so carefully worked out, which had been recognised by all Europe, to remain an empty scheme.

The Franco-Prussian War and the various questions of the conditions of peace between the two countries so absorbed the attention of Europe, that the Convention was forgotten; hence the reason for which the Navy is deprived of the aid of the Red Cross Society, the reason for which hundreds of lives have been, and will continue to be, lost, unless the War Conference takes measures to avert the calamity. Any question may be trampled down for a time, but if it has vitality sooner or later it must revive. It is impossible to doubt the essential importance of the question, and yet, strange as it may appear, it has never been brought forward at any of the subsequent meetings of the Red Cross Society, of which there have been four.

The first met in 1874 at Brussels, on the invitation of the Emperor Alexander II., the second at Geneva, in 1884, the third at Carlsruhe, in 1887, and the last at Rome, in 1892. Now, thirty years after the birth of the Convention of 1868, our Foreign Office (St. Petersburg) has again raised the question. There is no reason to fear that because so much time has elapsed the Convention may have lost its meaning, for the changes that have taken place are merely external. If there is little in common between a vessel of the year 1860 and one of our own day, the leading principles of naval war remain unchanged. As the crews of sinking vessels could have been saved *then* without injuring the success of the victory, so they could now, and I shall endeavour to prove it by historical examples.

During the American War of 1863, a great sea fight took place in Hampton Roads. The crew of the frigate "Congress," belonging to the Northerners, seeing that there was no escaping the ram of the "Merrimac," ran her aground. The enemy's gun-boats surrounded and opened a disastrous fire upon her. The "Merrimac," standing at two cables' length from the "Congress," kept pouring down her fire until the latter, unable to resist the enemy any longer, lowered her flag. The cannonade ceased; a steamer came up and announced its intention of setting fire to the "Congress," and offered to transport the wounded and the remainder of the crew on board their own vessel. There was no time, however, to put the plan into execution, before a detachment of the Northern troops, which had just come up to the shore, and with no suspicion of the peaceable intentions of the steamer, opened fire upon the enemy. The steamer was forced to retire, and the "Merrimac"

had no alternative but to continue the destruction of the unfortunate "Congress," which, in a short time, was wrapped in flames and exploded.

Had the laws of the Red Cross Society been enforced at sea, the steamer that offered to save the crew of the "Congress" would have hoisted a flag indicating its peaceable intention, the soldiers on shore would not have fired, and the crew of the "Congress" would have been saved.

Out of the many examples offered by the war between China and Japan, I shall quote the following one. On the 23rd of July, before war had been declared between the two countries, an English steamer, the "Kowshing," sailing under the British flag with an English commander and officers, left Takoo for Corea, with 1,000 Chinese troops on board. Early on the morning of the 25th, as she neared the coast of Corea, she sighted the Japanese fleet in the distance, crossing her track. One of the Japanese ships, the cruiser "Naniva," left the line of ships and steamed up to meet the "Kowshing." After passing and saluting the British flag politely, it turned back and signalled to the "Kowshing" to stop. Seeing that the signal was accompanied by two blank shots, the "Kowshing" anchored. A boat was lowered from the "Naniva" into which several Japanese officers stepped. On reaching the "Kowshing," they proceeded to investigate and to examine the papers, after which they ordered the commander, Captain Helsforth, to raise the anchor and to follow the "Naniva," utterly disregarding the fact that the vessel was English, was sailing under the British flag, and that it had left port before the declaration of the war.

The Chinese on board, ascertaining what the Japanese demanded, refused to obey orders, and, mounting guard over the anchor, informed the Europeans that they would throw everyone of them overboard if they attempted to leave the vessel. The Japanese moved away from the "Kowshing," and soon after hoisted the signal—"Start as quickly as possible." Captain Helsworth, understanding that the signal was meant for the Europeans, signalled back. "We cannot," whereupon the "Naniva" started her engines, blew a loud, shrill whistle, hoisted a red flag, turned round, discharged a Whitehead torpedo, and fired a broadside upon the "Kowshing." A fearful panic ensued on board the latter, but the Europeans, who had been ordered by the commander to assemble on the upper deck, jumped overboard and swam towards the "Naniva." The Japanese continued firing at the "Kowshing," and an hour later she slowly sank to the bottom, riddled with holes like a sieve. The first officer, Temphry, swam for a long time towards the "Naniva," and was then picked up by a Japanese cutter, the officers of which informed him that they had received orders to sink the two war-sloops which had just left the doomed vessel. Sure enough they opened fire upon the two sloops, which were crowded with Chinese, and sank them. What followed was the crowning horror of the day. The Japanese shot down the drowning Chinese, and, although this is contradicted by the Japanese, the truth of it has been confirmed by many Europeans. The French gun-boat "Lion" and the German vessel

"Iltis" were eye-witnesses of the slaughter, and saved 300 Chinese, the greater part of whom were wounded. The action of the Japanese in shooting down drowning Chinese was equivalent to killing the wounded on the field of battle. Although this incident seems to disprove what I have been trying to prove, *i.e.*, that the loss of the vessel only is of importance to the enemy, and not the loss of the crew; yet the mere fact of the Japanese denying their treatment of the Chinese, is a proof that they were not considered dangerous. It would be clearly in the interests of Europe were measures taken to prevent the repetition of such a deed. The interests of humanity, as well as our reasons for supposing that the next conflict will be in the East, call our attention to this matter. The Red Cross Society can more easily decide this question than any other.

The active part taken by the "Lion" and the "Iltis" again proves of what assistance neutral ships would be during a battle. The harm caused by their absence is confirmed by the battle of Yalu, where the fourth part of a crew of 700 men were drowned, thanks to there being no available hands to send from the Chinese vessels to save the drowning men.

The last sea fight which took place—the destruction of the Spanish fleet at Santiago—again illustrates this fact. When the "Vizcaya," following the noble example of her colleague, ran herself on to a reef, it happened to be at some distance from the shore. The crew threw themselves into the water, and tried to swim ashore, but half of the crew, 250 men, were drowned. Had there been life-boats on the scene of action, a considerable number might have been saved.

Until now, I have spoken of only one sort of victim of a sea fight—of the drowned—but there are other sufferers—the wounded. If we compare the number of drowned to the number of wounded, there will be treble the number of the former. At the battles of Lissa and Yalu, fought by the Italians, Austrians, Chinese, and Japanese, the comparative numbers would be 500 wounded and 1,500 drowned. It stands to reason that most attention is directed to the latter, but it is no reason to ignore the condition of the wounded. In the time of the sailing fleets, these unfortunates were, comparatively speaking, in favourable conditions. A large space amidships was allotted to their use, where the surgeon could bind up wounds and perform operations undisturbed. As this part of the ship was under water, they were in safety until the vessel sank; but in such a case the wounded were the first victims, although the old vessels did not sink so quickly as our modern "guaranteed not to sink" ones.

The condition of the wounded on board our modern men-of-war is terrible, chiefly from there being no room for them on the vessels. The comparatively free places on board are the cabins of the admirals and commanders, and ward-rooms whither the unhappy men are carried; but as these places are above water, there is no protection from the enemy's fire.

The wounded on land are in infinitely better conditions. As soon as they are carried out of the ranks they are placed on litters, and, if possible,



carried out of range of the enemy's bullets. So long as the number of wounded is small, they can be dealt with somehow or other, but when the number is great their position is a desperate one. I shall take as an example the case with the Japanese cruiser "Matsushima." A 12-inch shell exploded, killing and wounding 90 men. In order to get rid of such a burden as speedily as possible, the vessel had to leave the line of battle to have the wounded men taken off. This is another proof that the presence of neutral hospital-ships is a positive necessity. In former times, a hospital-ship did not possess the conditions necessary to enable it to accompany a squadron, or to follow the fleet to the place of action. They were simply transport-ships. During the Crimean War, France converted her old frigates "Christophe Colomb," "Eldorado," "Algérie," and "Prince" into similar transport-ships, which carried the wounded safely back to France. In our own times, only North America possesses hospital-ships—the "Solace" and the "Relief," but they did not accompany the fleet, and are only used as a means of communication between the land hospitals and the ships. They are both about 3,000 tons displacement, and can steam at a rate of from 16 to 17 knots an hour, with accommodation for several hundred patients.

At the beginning of my lecture, I reminded my hearers that the question of the Red Cross Society at sea is not a new one. In the year 1870, the Central Committee of the Red Cross Society in Berlin, which had worked hard in this cause, offered a prize for the best article written on the subject. The prize was won by Mr. Ferguson for his "Red Cross Alliance at Sea." According to the opinion of the above-mentioned gentleman, the Red Cross, and all those under its protection, should have the right of neutrality and must have hospital-ships and hospital-rafts (of which I shall give a description further on) placed at their disposal and a specially trained staff for both kinds of vessels. Hospital-ships must be constructed so as to enable them to keep up with the main body of the fleet. No matter at whose expense they may be built, whether at that of their Government or of Benevolent Societies, they must be at the disposal of the commander of the fleet in which they are for the time being. The commander and senior officers are appointed by Government, and are under guidance of those members of the Red Cross Society who have been chosen by headquarters, for the management of the hospital.

It is unnecessary to speak of the internal matters and medical administration of the ship, as each individual knows what his functions are with regard to the sick and wounded: good ventilation, comfortable beds, wholesome food, and, in short, everything in the domain of hygiene and medicine. Experienced naval doctors are of opinion that it would have been a great convenience were each squadron to be accompanied at all times by a hospital-ship, for the use of the sick men on board.

If each country had but one such ship, which, in time of war would be sent to the theatre of war and placed at the disposal of the combatants, the sufferings of the wounded would be considerably lessened. This might be carried into execution, since the Red Cross flag, under which

they would sail, is at all times and in all places working for the good of mankind without respect of nationality. During an engagement these vessels must be within reach of the combatants, but not near enough to impede their movements. As soon as it is evident that the loss of a battle-ship is impending, they must come as near the scene of the catastrophe as possible, and lower the hospital-rafts which replace the rescue-sloops. These rafts are made of three air-tight gutta-percha cylinders, encased in corresponding canvas cylinders. They are connected by means of five wooden boards lashed together and fastened to the cylinders; the boards serve as a means of separation between the cylinders to keep them at the required distance from each other, and also as seats for the passengers. An air-valve and pair of bellows are attached to each, by means of which the raft is propelled. Ledges, with rowlocks for the oars, are fastened to the edges of the canvas cylinders. When the raft is required, it is inflated in eight or ten minutes, and is then ready for use; when no longer required, the air is allowed to escape and the raft is folded up; in this form, a dozen such rafts will occupy less room than one life-sloop.

After many trials of various systems, preference was given by the South American States to that of Edward Perry, of New York. It is composed of three cylinders 22 feet long by 13 broad; when afloat, it covers a space of 10,000 feet, and when rolled up, is 2 feet in diameter and 13 feet long, and is rowed with six oars. It is impossible to say how far Mr. Ferguson's hopes on this raft may be well founded, as it has not been tried in a sea fight. I am afraid that, as their speed is not sufficiently great, they may run the risk of being foundered in the general confusion of a battle. In spite of the great boon they would be on such occasions, it would be impossible to use them alone as life-boats; there must be besides a rescue-ship of from 300 to 500 tons with powerful machinery. Such rafts would be of great use in time of peace in saving the crews of merchant-vessels, and in that way would have paid for their own support.

With regard to the crews of vessels and rafts, their medical staff, servants, etc., they must be trained in time of peace for their functions in time of war. If such preparations are considered a necessity for the Army, they are still more so for the Navy, which demands training of a special nature. A female staff of nurses on board a vessel would be highly desirable. The tender nursing and gentleness of the Sisters of Mercy are too precious that the sick should be deprived of them. The mere presence of a woman is often more beneficial to the patients than any medicine. The difficulties of a sea life are of no consequence to our Sisters of Mercy, and it is said that women so speedily get accustomed to life on board ship, that they might serve as an example to the sailors themselves. Besides the questions concerning International Administration, which we have already touched, we must likewise specify:—Firstly, the kind and class of hospital or rescue ship and rafts or sloops with their various signs and colours; secondly, the introduction of a uniform to be worn in common by the crews of these ships; thirdly, to determine the

places which the hospital-ships are to occupy in ordinary times, as well as in time of war; fourthly, to make out a code of national signals between the Red Cross vessels; fifthly, to draw out the instructions to be given to the doctors, assistant surgeons, and the other members of the medical staff; sixthly, to decide what rewards shall be given to those who have distinguished themselves in action by acts of bravery and abnegation in saving life or giving aid to the wounded; likewise the pensions to be given to the relatives of those who have lost their lives in the Service.

In conclusion, I shall endeavour to answer the question, What must be done to extend the aid of the Red Cross Society at sea?

The foundation to it has been laid by our Foreign Office (St. Petersburg) in reminding the other Powers of the Convention of 1868. There can be no doubt as to the interest attached to this question for all those countries with fleets at their command, so that the reminder will surely be graciously accepted. The Governments must help the Red Cross with legalised power and money, and society must show its interest in the question by reviving it. War in the present century is terrible in every respect—terrible from the number of its victims.

The Army and Navy have attained colossal proportions, and the number of victims has increased in proportion. Is it not our duty to try and lessen the horrors of war? The demand for money will be met with opposition on all sides. It will be said that, as it is, too much money is spent on the Army and Navy, and that any further increase is out of the question. But who will have the courage to say that? Certainly not he who risks his life for his country's safety! Can the question of money be an impediment when it concerns anything so precious as human life?

In three years Russia spent one milliard of roubles on her Army and Fleet. Let her take but one million from that sum and devote it to this purpose, and even that will not be too much in so noble a cause.

## THE KAISER ALEXANDER III. HARBOUR AT LIBAU.

Résumé of an article in the "Mittheilungen aus dem Gebiete des Seewesens," from the "Morskói Sbórník."

THE extensive works, which have now been in progress for some years, to convert this port into a harbour capable of holding a large fleet, and which is believed to be sufficiently free from ice to allow of easy ingress and egress all the year round, are now so nearly completed that several vessels of the Baltic Fleet lay here last winter.

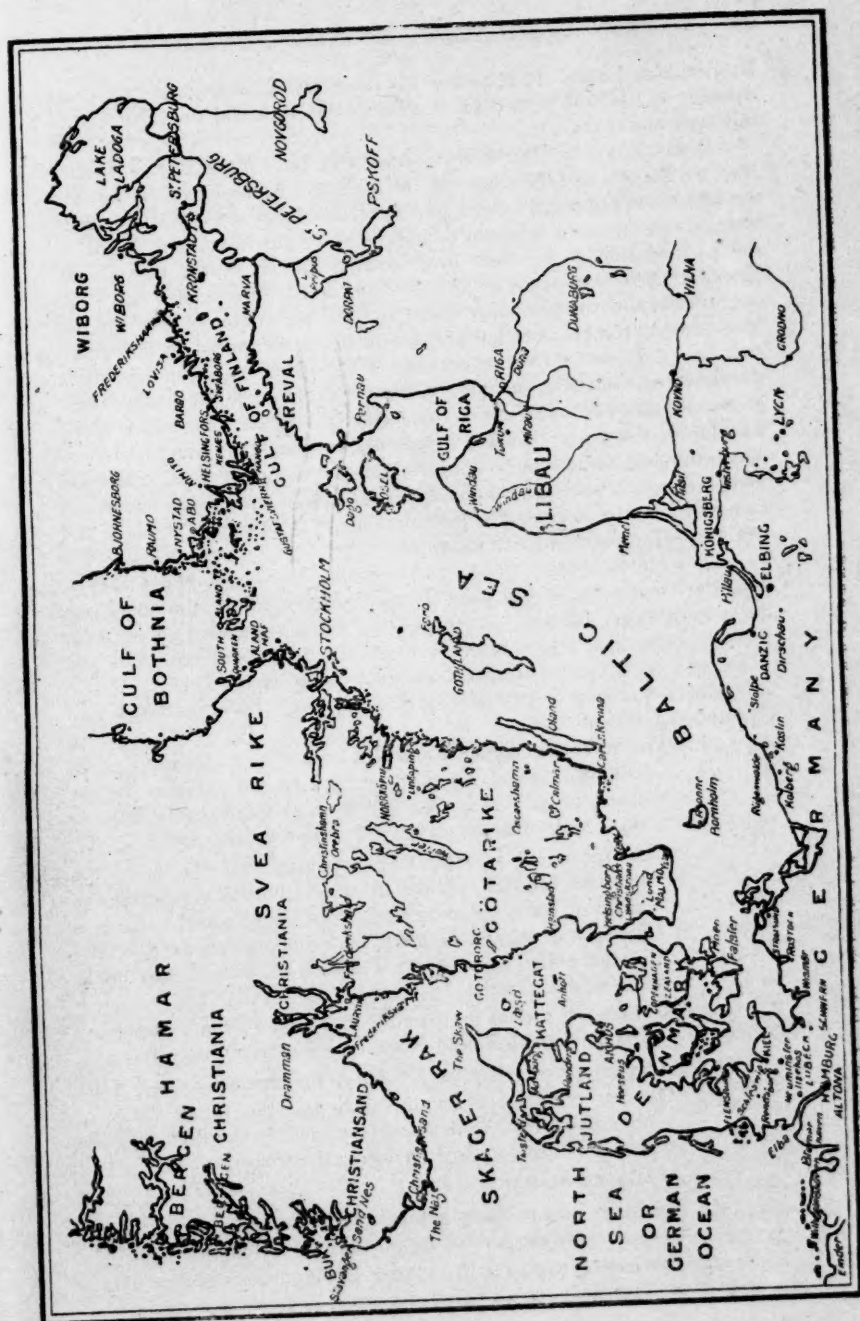
*Historical.*—*The Reasons for the Choice of Libau as a Strategic Base.*—Ever since Peter the Great founded St. Petersburg and fortified Kronstadt, Reval, and Rogerwik for its defence, the Russian authorities have had in view the creation of a base, which should form the central point of an effective system of coast defence, as well as being a *point d'appui* for the Baltic Fleet.

Reval was at first considered as likely to fulfil the necessary conditions, and steps were taken to improve and strengthen the town. When Finland was annexed, Reval, in consequence of the limited size of the harbour, no longer sufficed for the growing needs of the fleet, and Sveaborg was in its turn selected as the harbour and base of operations of the Baltic Fleet. In the time of the Emperor Alexander I., Russia possessed in the Gulf of Finland only three fortified harbours—Kronstadt, Reval, and Sveaborg—as Rogerwik had in the meanwhile been abandoned.

The fact that the Baltic coasts were for want of proper fortifications still exposed to the attacks of a hostile fleet, led, in order to be in a position to effectively meet any hostile operations, during the reign of the Emperor Nicholas I., to a project for making a harbour and arsenal at Bomarsund in the Aland Islands. The carrying out of this plan, however, was so delayed, that in view of the political outlook it became necessary to improve and greatly strengthen the existing works at Kronstadt, Reval, and Sveaborg, so that, whatever happened, these places could be depended upon to afford shelter.

In 1852 again, in consequence of the fear of foreign complications, a commission was appointed to consider the question of coast defence in the Baltic, and they reported in favour of Kronstadt and Reval being strengthened by new permanent fortifications, that Dünamunde should be permanently fortified, while works should be provisionally thrown up at Abo, Friedrichshamm, Kumend, the Travnend Islands, and the mouth of the Narva, and that, as a further precaution, the channel at Kronstadt and at the most important points through the shoals should be blocked.





Kronstadt and Sveaborg remained the two most important bases for coast defence, and for the protection of other places it would be necessary to rely upon the Army.

It was, however, clear that the stretch of coast from Riga to Libau, Abo to Tornea, and the whole of the Monsund Archipelago, lay outside the effectively protected sphere, and were absolutely exposed to hostile attacks, against which it would be impossible to provide. With regard to the participation of the fleet in protecting the coast, the commission agreed that it was not advisable to hamper its movements; the ships ought certainly to eventually assist in the protection of the Finnish harbours, but the bulk of the fleet would be concentrated in Kronstadt and Sveaborg, while for the defence of the fjords and channels inside the shoals and islands, a number of light-draught coast gun-boats should be at once laid down. Without going closely into the operations of the war during the years 1854-55, it may be asserted that the passive rôle which the fleet was forced to adopt, which was due partly to its inferiority and partly to the want of a suitable base in the Baltic from which to operate, compelled Russia to keep a formidable body of troops—280,000 men and 384 guns—for the defence of the coast.

The unfortunate experiences of the years 1854-55 compelled Russia, after the conclusion of the war, to once more consider the important question of coast defence. A commission again assembled to consider the whole question, and to report what point on the Baltic coast was best suited to serve as a base of operations for a coast-defence fleet.

The commission first considered the existing fortified harbours, and reported as follows:—

1. The harbour of Reval is unsuited both from its position and its confined space, for forming an important station for the fleet; to enlarge it and fortify it properly could only be done with difficulty and at a disproportionate cost.
2. Sveaborg offers an excellent anchorage for the fleet, but requires for the defence of the harbour a very extensive chain of fortifications, and for five months in the year it is ice-bound. Moreover, neither in Sveaborg nor in the vicinity is there any suitable place where an arsenal and docks can be constructed.
3. Kronstadt is too far up the Gulf of Finland; the harbours are cramped, shallow, and blocked by ice during the winter.

The commission then arrived at the following conclusions:—

- a. The harbour, which is to serve as the future base of operations for the Baltic Fleet, must in the first place be one which seldom freezes during the winter.
- b. Reval must be struck out.
- c. Sveaborg has, without extending the existing fortifications, to serve as the *point d'appui* of the fjord flotilla.
- d. But having regard to the strategical importance of the island, Kronstadt should be strengthened by new fortifications.

How far the conclusions of the commission were approved it is impossible to say, but the fact remains that for many years no attempt was made to carry out the first one (*a*). Strategical, as well as financial grounds, may have been the cause, as it was considered that the projected Baltic port would cost 23 million roubles, exclusive of the cost of the fortifications. With the construction in 1868, however, of the Romny-Libau Railway, a new harbour, viz., that of Windau—was suggested, only however soon afterwards to drop into oblivion. The war of 1870-71 led to a still further strengthening of the fortifications of Kronstadt, Sveaborg, and Dünamunde, that of 1877-78 to a shelving of the whole question.

However, the steady development of the Baltic Fleet, the growth of the German Navy, with the shifting of its naval centre from the North Sea to the Baltic, together with the construction of the Kaiser-Wilhelm Canal, finally compelled Russia, in the interest of her own maritime power, to attempt to settle this most important question once for all. The result was, that Libau, on the coast of Courland, was finally settled upon in 1890, that province having been at last connected with the interior by railways, and the same year the construction of the harbour with the necessary dockyard works, suitable for a first-class naval station, were put in hand.

In determining the value of Libau as a base of operations for the Baltic Fleet, it must be remembered that until lately the readiness for action of the latter has depended upon the meteorological conditions obtaining at the given time of the year. For the future, the Baltic Fleet will be free to operate all the year round, as, even in abnormally severe winters, the new harbour is only frozen over for a very short time, and this but rarely. The great importance of Libau is thus established.

It may well happen that, when the temperature is low, masses of drift-ice may accumulate on the coasts of Courland and for a time hinder the navigation, but this, even if it should occasionally occur, does not take away from the importance of Libau, for a hostile fleet operating against the Baltic coasts would be in a worse position in that case than the ships which may be confined in the harbour, and it is not rare to find Libau completely free from ice, while all navigation through the Belts is stopped by ice. The imprisonment of the Baltic Fleet, therefore, in Kronstadt and Sveaborg, from December to April or May, each year, may now be considered a thing of the past, and the squadron will remain, instead, ready for service.

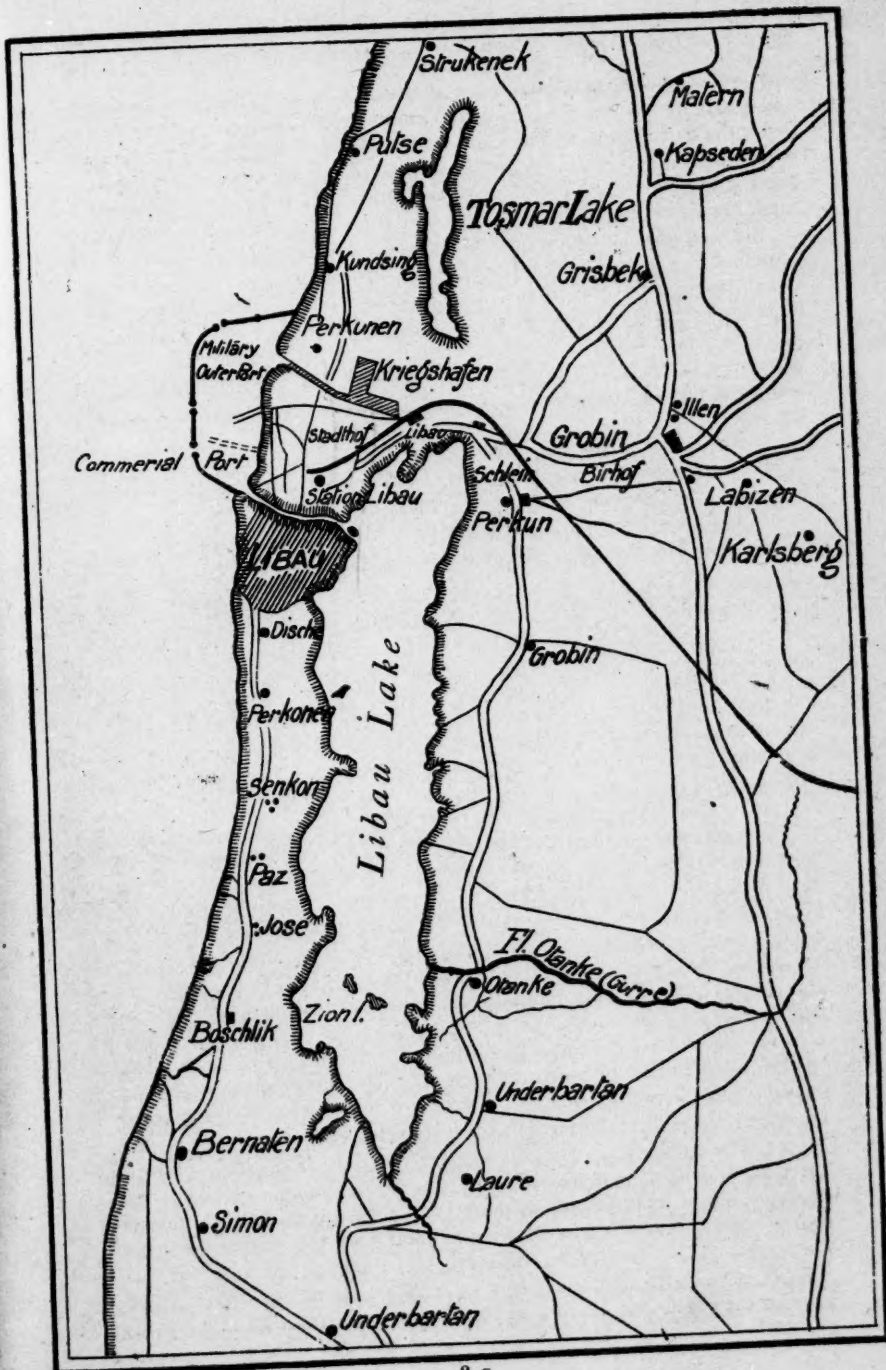
It is believed that the southern position of the new harbour will secure to the fleet a very advantageous base for operating against an enemy attempting to attack the Baltic and Finnish coasts. While the Russian fleet is in Libau, the defence of the Monsund channel is effectively secured, and with the entrance to Riga and the other harbours in the Gulf of Finland properly barred by mines, the coast from Libau to Abo will be inaccessible to an enemy, and the necessity for concentrating a large body of troops for the defence of the coast removed. There is no fear that the unfortunate events of 1854-55 will be repeated in the future.

Libau is thus called upon to play a very important rôle in the future, commanding as it does the western portion of the Baltic with the east coast of Denmark and the south coast of Sweden, and its importance will be recognised when it is remembered that before the construction of the harbour and dockyard here, there was not a single harbour on the whole coast, till Kronstadt is reached, in which any repairs to ships could be carried out. Although Libau becomes the base of operations for the Baltic Fleet, Kronstadt does not lose any of its importance in conjunction with St. Petersburg as the principal building yard and arsenal in the Empire, or as the base for operations in the Gulf of Finland; while Sveaborg also still remains a *point d'appui* for small divisions of the fleet, and will always remain a base for extending defence operations to the Monsund Archipelago, the Aland Islands, and the fjords along the coast of Finland.

*Libau and its Surroundings.*—Libau is the most southern Russian harbour in the Baltic, and the most western in the Empire. It lies in  $56^{\circ} 40'$  N. lat. and  $21^{\circ}$  N. long., at the north end of a narrow, sandy tongue of land, which separates the Lake of Libau from the sea. A canal built in the seventeenth century connects the lake with the sea, dividing the town into old and new Libau, serving at the same time as a harbour for merchant-vessels. The country round Libau is everywhere low-lying and flat, rising along the shore hardly more than thirteen feet above the sea-level, while towards the lakes the land sinks to a height of only three feet above the water. Both lakes, Libau and Tosmar, are very shallow and sandy, only navigable by nearly flat-bottomed boats. A small navigable river, the Bartan, flows into the Libau Lake and serves as a route from the interior for produce making its way to the harbour. North of Libau, and distant about three-quarters of a mile from the shore, lies for a considerable distance a chain of sand hills from forty to fifty feet high. A fine white sand covers the whole country round Libau as far as the two lakes, to a depth of some twenty feet below the level of the sea; below the sand is a stratum of coarse sand and rubble, below that again is stiff clay intermingled with granite, and a further stratum of limestone and stiff clay, from which, by means of artesian wells, the water supply of Libau is procured. Here, as everywhere else along the shores of the Baltic, granite is found in large quantities, and has been extensively used for the new harbour works.

*The Meteorological Conditions.*—High and low water at Libau depend largely upon the prevailing winds. With strong easterly and north-easterly winds, the sea-level falls on the open coast about three feet, and with strong south-westerly winds rises from three to five feet above the normal height. The water is at its lowest in May and its highest in December. From January to April the prevailing winds are from N. and S. to E., and from May to December westerly. The S.W. winds are particularly stormy and frequent, while winds from the S.S.W. and N.N.W. prevail as a rule for nearly half the year. The land winds from the S.S.E., N., and N.N.W. are generally light and very rarely stormy. The strength of the surface currents at Libau depends upon the strength of the prevailing winds. When the wind is between south and west, particularly during





S.W. gales, the current sets to the north at a rate of from one to one and a half knots an hour; with N.W. and N.N.W. winds, on the other hand, the current sets to the south from half a mile to one mile an hour. Owing to the geological formation of the coast, the coast-line is continually undergoing changes, in consequence of the large quantities of sand, in particular, which are thrown up during gales and by the currents. As the strongest and most prevailing winds are from the S.W., so the principal movement of the sand is from south to north, so there is a continual deposit on the western side of all points of land, breakwaters, etc. This is particularly noticeable since the building of the southern breakwater, where such vast masses of sand have been thrown up as to materially increase the height of the sand-hills in the neighbourhood, and, as a further consequence, is the silting up of the canal leading to the lake.

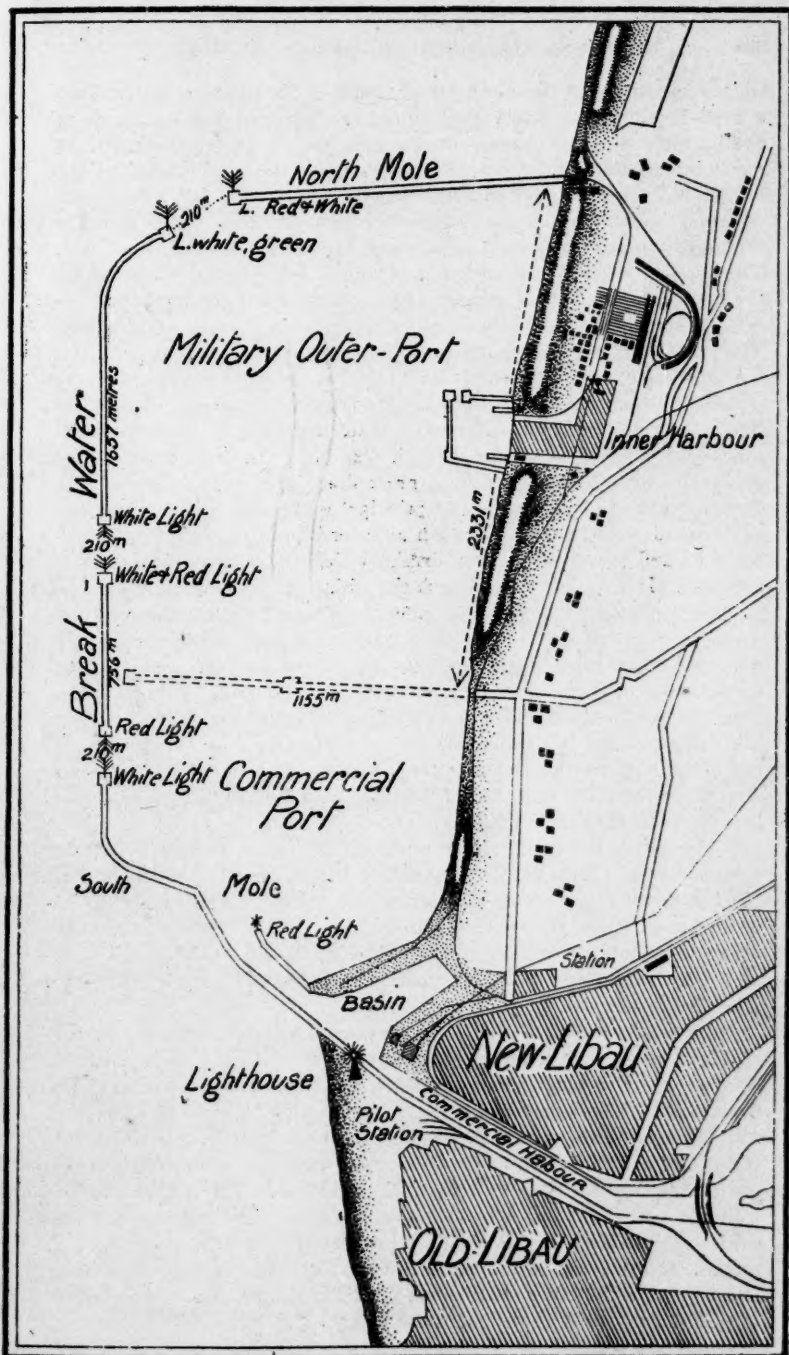
As we have already mentioned, Libau is the only Russian harbour in the Baltic which is seldom frozen in the winter, and then for only a very short time. Between 1857-69, the traffic for sailing-ships was only suspended on account of the ice for nine days. Between 1869-87, the harbour was frozen up only on the following occasions:—

February, 1871	..	..	..	for 7 days.
December, 1875	..	..	..	" 7 "
February, 1880	..	..	..	" 1 "
March, 1883	..	..	..	" 2 "

In the winter of 1886, which was an unusually severe one, all communication with the sea was interrupted from the 21st February to the 3rd March, and during the winter of 1892-93, all traffic was again suspended for fourteen days. But it is believed that the new ice-breakers will be able quite easily in the future to keep the harbour and entrance to it clear for the movements of ships.

The relatively high winter temperature, the steady flow into the sea from the Libau Canal, keeping the water continually in movement, combined with the currents, all act as preventives against the formation of ice in the harbour. The masses of ice coming down from the north are unable to collect before the harbour, thanks to the conformation of the coast-line, while with southerly and south-westerly winds the temperature always rises above freezing point, breaking up and driving away any ice-fields in the neighbourhood.

*The Outer Military Harbour.*—This harbour, which is quite artificial, has been constructed by means of moles running out from the shore and of two large breakwaters, and forms an almost regular square, whose sides are one and a half miles in length, enclosing an area of about three square miles. The mole, which shuts in the northern side of the harbour, runs out from the land in a westerly direction for a distance of about one thousand seven hundred and seventy yards; two breakwaters running nearly north and south protect the harbour from the west; the most northerly of these breakwaters is some one thousand six hundred and fifty-seven yards in length, and at its northern extremity curves round towards the north-east, leaving an entrance of two hundred and ten yards



wide between it and the north mole; between its southern end and the second breakwater is another entrance, two hundred and ten yards in width, while a third channel of the same width is left between the southern extremity of the second breakwater and the northern end of the mole, which shuts in the harbour from the south; this latter mole runs out from the land in a north-westerly direction, and then curves round to the north towards the second breakwater, leaving a channel as described. The depth of water in the harbour is as follows:—Two hundred yards from the shore, thirteen feet six inches; at five hundred and fifty yards, twenty-one feet six inches; and off the breakwaters from twenty-eight to thirty feet. The three entrances, which, as mentioned before, are two hundred and ten yards wide, have a depth of thirty feet, but there are banks before the entrances which have only from twenty-three to twenty-seven feet on them. At some two thousand yards distance from the breakwaters, good sandy bottom can be found in six fathoms water. In order to make the navigation quite safe for ships of great draught, it will be necessary to dredge out a channel before the principal entrances, two hundred and twenty yards wide, and with a depth of water in it of not less than thirty-one feet, and to remove the sand-banks, which ought not to be a work of difficulty. It is in order to diminish the silting up of the entrances to the harbour by the sand that the breakwaters have been built in a northerly and southerly direction, as it is calculated that the currents, mostly setting in a northerly direction, will take the sand with them, and that similarly any formation of drift ice off the harbour will be prevented. It is probable, however, that dredgers will have to be kept continually at work; although the danger of any silting up of the military harbour is believed to be much lessened by the fact that the commercial harbour has been constructed to the south of it, from which it is separated by a breakwater one thousand one hundred yards long.

The cost of the outer harbour works will amount to a sum of 9,795,000 roubles (about £1,400,000). The material used for the construction of the breakwaters and moles is concrete and granite. The height of the north mole above the water is nine feet, and of each of the two breakwaters only six feet, in order to allow of the sea washing over them and so assisting to prevent the formation of ice by the movement of the water in the harbour.

*The Inner Harbour.*—The plans for the inner harbour were sanctioned in May, 1894; the entrance is nearly opposite to the main channel leading into the outer harbour, and there are two large basins under construction; one, eight hundred and forty yards long by two hundred and fifty-two yards wide, will be used for ships fitting out, while the second, eight hundred and sixty-one yards long and two hundred and ten yards wide, will be used by ships in commission. The communication with the outer harbour is by means of a channel one hundred and five yards wide at the bottom, with a mean depth of twenty-nine feet six inches. To the west of the first basin are the barracks and storehouses, and adjoining the other a dry dock. Machine shops, etc., and a slip for torpedo-boats are being constructed, while coal stores will be erected



close to the entrance; but all this work will not be completed for several years, while the cost will be about 15½ million roubles (£2,200,000).

The barracks are to accommodate one thousand men, and the coal and provision stores to hold supplies for nine battle-ships and nine smaller vessels, and the hospital to have bed accommodation for two hundred sick.

Some years must obviously still elapse before Libau can be considered as an effective base for the fleet, but most of the difficulties in the way of carrying out the work have been now overcome, so its completion is only a question of the necessary money being found. But a strong opinion exists that Libau will never be worth the money it is proposed to expend on it, as the danger of the silting up of the harbour and its approaches may well prove more formidable than is at present believed, while in any case large ships will have to navigate in those waters with great caution, and in bad, foggy, or even misty weather, and at night, it will be extremely difficult to make the harbour safely. Moreover, to the sum of 22,000,000 roubles already mentioned, must be added a further sum of 15½ million roubles for fortifications, Libau at present being quite unfortified, and no protection will be afforded to ships lying inside the new harbour until the projected fortifications are built. It is therefore suggested in some quarters that this money might be better spent in large cruisers, which would find shelter in harbours on the north coast of Russia which are now known to exist, and, owing to the Gulf Stream, to be ice-free.

As a port for wintering a portion of the Baltic Fleet, and also as a base in war for the operations of a torpedo flotilla and light vessels, Libau will probably serve admirably, but it is very doubtful if it can be ever used as a real base for the operations of the Baltic Fleet.

## NAVAL NOTES.

**HOMER.**—The first-class cruiser "Hawke" and the second-class cruiser "Scylla" both arrived at Plymouth on the 2nd ult. from the Mediterranean; they have since arrived at Chatham where they will pay off. The first-class cruiser "Edgar" arrived at Plymouth from the Mediterranean with relieved men, and she is to be paid off at that port and refit in readiness for further relief duty. The first-class gun-boat "Magpie" arrived at Plymouth on the 6th ult. from the West Coast of Africa and Cape stations and will pay off at that port. The first-class gun-boat "Lizard" commissioned at Devonport on the 7th ult. for the Australian station, and left on the 21st ult. for her destination. The first-class battle-ship "Camperdown" arrived at Plymouth on the 21st ult. from the Mediterranean, afterwards proceeding to Portsmouth, where she will pay off.

**Steam Trials.**—The new first-class battle-ship "Ocean" has commenced her trials, which with those of the "Canopus" and "Goliath" will be watched with great interest, as they are the first battle-ships fitted with the water-tube boilers, which are of the Belleville type in all three ships. The results of the first trial for thirty hours at 2,700-I.H.P. were very satisfactory, and were as follows:—Steam, in boilers 210 lbs., at engines 184 lbs.; vacuum, starboard 27·8, port 27·5; revolutions, starboard 66·6, port 67; I.H.P., starboard 1,431, port 1,336—total, 2,767; air pressure, *nil*; speed, 11·4 knots. The second thirty hours' trial was equally successful, the conditions being that a mean I.H.P. of 10,000 should be developed continuously during the trial. The results of the trial were as follows:—Steam, in boilers 259 lbs., at engines 221 lbs.; vacuum, starboard 27 inches, port 26; revolutions, starboard 101·9, port 103·1; I.H.P., starboard 5,084, port 5,230—total, 10,314; air pressure, *nil*; speed, 16·2 knots; coal consumed per I.H.P. per hour, 1·6 lbs.

The new third-class cruiser "Perseus," built and engined by Earle's Company at Hull, has completed her four hours' forced-draught trial successfully, with the following results:—Draught of water, forward 11 feet 6 inches, aft 14 feet 10 inches; pressure of steam, in boilers 265·9 lbs., in engine-room 249·9 lbs.; air pressure, 2·39 inches; vacuum, starboard 24·2 inches, port 23·3 inches; revolutions, starboard 214·8, port 214·6; mean pressure, starboard, high 102·6, intermediate 50·4, low 18·9; port, high 103·3, intermediate 51·6, low 18·7; I.H.P., starboard 3,523·2, port 3,545·5—total starboard and port, 7,068·7; speed 20 knots. The contract with Earle's Company was for 7,000-H.P.

The new third-class cruiser "Prometheus" has completed her four hours' forced-draught trial successfully with the following results:—Pressure of steam in boilers, 262·6 lbs.; ditto in engine-room, 249·7 lbs.; air pressure, 2·58 inches; vacuum, starboard 24 inches, port 24·1 inches; revolutions, starboard 225·1, port 219·9; I.H.P., starboard, high 1,028·0, intermediate 1,388·1, low 1,238·7—total, 3,654·8; port, high 1,036·9, intermediate 1,306·3, low 1,276·7—total, 3,619·9; aggregate I.H.P., 7,274·7; speed, 20·8 knots. The I.H.P. was 274·7 in excess of the contract with Earle's Shipbuilding and Engineering Company.

The new torpedo-boat destroyer "Coquette," built by Thornycroft & Co., has also been successful, the result being as follows:—Draught of water, forward 5 feet 11½ inches, aft 7 feet 4½ inches; speed, 30·211 knots; steam pressure in

boilers, 216 lbs. per square inch; air pressure in stokehold, 2.72 inches; vacuum in condensers, starboard 25.0, port 24.9; revolutions per minute, starboard 383.8, port 388.6; mean I.H.P., starboard 2,820, port 3,048—total, 5,868. The contract requirements were exceeded.

A terrible accident occurred on board the new destroyer "Bullfinch" when running her steam trials in the Solent on Friday the 21st ult., which resulted in the death of eleven men, four others being more or less injured. The "Bullfinch" commenced her trials some two months ago, but they had to be abandoned, and since then she had been in the contractor's hands making good defects. On the 21st the vessel started again on a three hours' trial at 30 knots, and had made six runs over the measured mile with satisfactory results and was within a quarter of an hour of completing her trial, when the starboard high-pressure connecting rod broke close to the fork, the piston knocked the cover off, which so liberated the steam that the men, who were in the forward end of the engine room, had no means of escape and half of them were scalded to death. The end of the connecting rod was sent with great force through the bottom of the vessel, causing her to leak badly. No one on deck was injured, although there were some narrow escapes, as the deck was strewn from stem to stern with *débris* ejected from the engine-room by the escaping steam. The injuries to the hull have since been found not to be serious.

*Night Signalling in the Mediterranean.*—The results of the fifth competition in night signalling, held in June, are very satisfactory, and show that the high standard of excellence to which the signal officers and men under the direction of Admiral Sir J. O. Hopkins, late Commander-in-Chief, had reached, has in no way deteriorated. True, some of the ships have changed their order of precedence, but that may be accounted for in a measure by the changes in the staffs and other causes incidental to a fleet. Two hundred and seventeen signal ratings competed, viz.:—81 petty officers, 88 qualified signalmen, 44 signalmen, and 4 boys. The results in order of merit were:—"Ardent," 96.4; "Camperdown," 95.7; "Boxer," 95.6; "Surprise," 95.6; "Castille" (Commander-in-Chief's office), 95.3; "Anson," 95.1; "Hussar," 95; "Illustrious," 94.7; "Thetis," 94.6; "Revenge," 94.4; "Cæsar," 94.4; "Royal Sovereign," 94.3; "Vulcan," 93.1; "Hibernia," 93.3; "Ramillies," 92.5; "Empress of India," 92; "Tyne," 92; "Isis," 90.8; "Royal Oak," 90.8; "Stork," 90; "Hood," 87.4; "Theseus," 85.6; "Venus," 85.4; "Bruizer," 80.4; men recently joined, 64.3. The general average of the fleet was 92.6. The best results were obtained by J. J. Cook, qualified signalman, of the "Anson"; C. Crisp, qualified signalman, of the "Hood"; and A. Shimmifield, yeoman, of the "Revenge," who each made 99.6. T. Burke, second yeoman, of the "Ramillies"; C. E. Snell, yeoman, of the "Illustrious"; G. Secoter, leading signalman, of the "Isis"; and G. Douch, second yeoman, of the "Empress of India," 99.2 each. Special notice was called to the high percentage made by the "Ardent," and the advances made by the "Camperdown," "Revenge," "Anson," "Ramillies," "Isis," and "Royal Oak."

*Non-flammable Wood.*—The Admiralty have decided to establish another reform in war-ship construction by the introduction of non-flammable wood. The first vessels to be fitted with this new material are the battle-ships "Implacable" and "Bulwark," in course of construction at Devonport, and the chief constructor has been directed to introduce as much of the non-flammable wood as possible without altering to any great extent the working designs of the ships. It will be used for cabin doors, bunks, and bulkheads principally in the "Implacable" and "Bulwark," but as the Admiralty have decided to adopt it generally for service use it is considered probable that in future the designs of new ships will provide for the substitution of non-flammable wood for a large quantity of the permanent fittings now made of steel.—*Naval and Military Record.*

*Launch.*—The new first-class battle-ship "Vengeance," launched on Tuesday, the 25th ult., by Messrs. Vickers, Sons, and Maxim, Ltd., Barrow-in-Furness, was laid down on August 23rd, 1897, and is to be completed next spring at a cost of £870,419, according to the Navy Estimates. There is no doubt about this time result being realised, as the vessel is much further advanced than is usually the case with vessels to be launched into the water on ways. She is 390 feet long between perpendiculars, 74 feet beam, and some concessions have been made in her design to insure a draught of only 26 feet when she is in full working order. The displacement then will be 12,950 tons, of which 8,550 tons are due to the hull. She may be said to belong to the "Canopus" class, although having been ordered a year later, she embodies several changes in detail. Like the five vessels of the type named, her side armour is of 6 inches thickness instead of 9 inches; but, the face being specially hardened, the shot-resisting power will be greater than that nominally corresponding to the thickness. The broadside armour is 14 feet deep, being carried 5 feet below the load-water line and extends for a length of about 196 feet, leaving about 100 feet forward and aft unarmoured, but this is more nominal than real, for instead of the thwartship bulkhead being, as has hitherto been general, at right angles to the line of the ship, the end armour is arranged in the form of a >, the point being towards bow and stern, and as this is from 12 inches to 8 inches thick, thinning towards the bottom, it extends the armour protection. Again, the side armour is carried to the ram as 2-inch nickel-steel plating, which broadens as it extends forward till it reaches from top to bottom, and thus the ram is greatly reinforced. Here it may be said also that the fore-foot is greatly cut away, as is also the deadwood aft to improve the circle turning of the ship. Aft the citadel the side plating is made thicker at the load-line for a depth of quite 10 feet. The protective deck is 3 to 2 inches thick, and as usual, is curved from the bottom of the side armour to above the water-line in the centre. This curve enables the engines to be entirely below the deck, obviating the necessity for an armoured coaming round the cylinders. There is the usual bunker protection, and coal is carried both under and upon the protective deck, the other levels within the length of the citadel being middle, main, upper, and boat decks. The last-named, however, does not extend the full width of the ship. At the end of the ship there is a platform below the protective deck.

The barbettes for the pairs of 12-inch guns are immediately within the > at the forward and after end of the citadel. These are 36 feet 8 inches in diameter, of 12-inch Harveyized nickel steel. There are eight 6-inch Q.F. guns in casemates on the main deck protected by 6-inch armour, and four on the upper deck in similar casemates. The bow and stern Q.F. guns have a range to 28° abaft or forward respectively, and the broadside guns the usual 120°. The casemates are in plan very irregular octagons, the end ones being almost triangular. There are, in addition, eighteen smaller guns, three 12-pounders in the citadel on each broadside on the upper deck, and four on the main deck, two firing forward and two aft. The machine guns are on the bridges and military tops. The masts are very lofty, and carry search-lights, which are placed on a platform well raised. There are two navigating bridges, one forward and one aft, and two conning-towers, the forward one having 12-inch Harveyized nickel steel, and the after 3-inch nickel steel. The voice-tube and ammunition-hoists are armoured.

The "Vengeance" is, of course, propelled by twin-screws, each driven by an independent set of triple-expansion engines, with three vertical cylinders of the collective power of 6,750-I.H.P., the aggregate being 13,500. This is attained with the engines making 108 revolutions, and with a steam boiler pressure of 300 lbs. per square inch, reduced to 250 at the engines, and at this point it may be said that the total weight of the machinery, main and auxiliary, including boilers and the water in them is about 1,200 tons. The high-pressure cylinder is 30 inches in diameter, the intermediate-pressure 49 inches, and the low-pressure 80 inches, the stroke being 51 inches. The cylinders are separate and



independent castings, stayed together, and all the barrels are jacketed. The high-pressure and intermediate-pressure cylinders are each fitted with one valve of the piston type, and the low-pressure cylinder with the ordinary flat valve fitted with equilibrium rings. The valve gear is the double eccentric ordinary link motion. The straps are separate from the rods, and of forged steel, lined with white metal. Double-cylinder reversing engines are fitted, which in 30 revolutions turn the main engines from full gear ahead to full gear astern. The starting position, it may be added, is amidships.

The bottom frames of the engine are of cast steel, and are bolted together to form one complete bed-plate for each set of engines. Bolts, and not studs, are used for securing the main bearing caps. The front columns are forged steel, and the back columns are of cast-iron with guides bolted to them.

The main steam pipes are of steel, lap-welded with butt-strap over the weld for pipes down to, but not including, 6 inches. Below this they are solid-drawn steel down to  $1\frac{1}{2}$  inches in diameter; below this again they are of solid-drawn copper. Reducing valves are fitted in the main steam pipe in each engine-room between the main shut-off valve and the regulating valve. Separators are fitted in the engine-room, one each side, on the boiler side of self-closing valves.

There are twenty boilers of the Belleville type, with economisers, and all recent improvements. Each boiler can be used independently of the others, and works at 300 lbs. per square inch. The boilers are arranged in three compartments, eight in each of the forward and middle boiler-rooms, and four in the after. There is no middle-line bulkhead in the boiler-rooms. Fifteen of the boilers have nine elements of large tubes  $4\frac{1}{2}$  inches in external diameter, and five boilers consist of eight elements of large tubes  $4\frac{1}{2}$  inches in external diameter, each element containing seven pairs of tubes. All the boilers are fitted with economisers, those in the wings of the ship having six elements, and the remainder seven elements in each case. The economiser elements consist of ten pairs of tubes  $2\frac{3}{4}$  inches in external diameter. The heating surface is 21,760 square feet in the main tubes, and 12,010 square feet in the economisers, the total being 33,770 square feet. The boiler tubes are all of British manufacture, as also the material from which they are drawn. The tubes are all solid-drawn, finished cold, carefully annealed after manufacture, and subjected to severe tests. Each tube is coated externally with zinc by electro-deposition at the Barrow Works.

As to the auxiliary engines in the ship, some brief reference may be made. The distilling machinery, by Messrs. Weir, consists of two evaporators capable of evaporating from sea water 68 tons per 24 hours when worked not compound, and 42 tons when worked compound. The two distillers produce 40 tons of fresh aerated water per day, for drinking, at  $15^{\circ}$  Fahr. above that of the circulating water, with circulating water at not less than  $75^{\circ}$  Fahr. The electric light machinery consists of three sets of combined engines and dynamos, the electromotive force being 80 volts for all loads from 10 up to 600 ampères.

There are two double-cylinder direct-acting steering engines of sufficient power to move the rudder from hard-a-port to hard-a-starboard, and *vice versa*, through an angle of  $70^{\circ}$  in 30 seconds with the vessel proceeding at a speed of  $18\frac{1}{2}$  knots and a pressure in the steam pipes of 200 lbs. per square inch. There are four sets of engines and pumps for air compressing, two boat hoists, two refrigerating machines, two coal hoists, five ash hoists, five air-blowing engines, and for ventilating the ship there are eight electrically driven fans, six with 3-foot 6-inch, and two with 3-foot discs. These are distributed throughout the ship. There are also two steam fans 7 feet 6 inches in diameter, one in each engine-room, and four fans of 8 feet diameter and two of 6 feet diameter for the boiler-rooms. Each fan is double-breasted.

The ship will have a better appearance than the "Canopus" class, for, in addition to other changes, both funnels are of the same diameter—11 feet. They are 90 feet high from the grates, and are spaced at 23 feet centres.—*Engineering and other sources.*

*Hydrographer's Report for 1898.*—The annual report by the Hydrographer to the Admiralty states that the number of officers of all ranks employed in the several vessels amounted to 75, of whom 52 are surveying officers, and their crews to 639. The expenses of the Queensland survey, carried on in the "Dart," are shared between the Imperial and Colonial Governments. A naval surveying officer is also employed, with the sanction of the Admiralty, under the Indian Government. Brief allusion to the labours of the Indian survey during 1898 is herein made.

During the year 1898 no less than 230 rocks and shoals which were dangerous to navigation were reported, and were notified to the public by notices to mariners. Of these, 44 were reported by surveying vessels, 30 by others of H.M. ships, 9 by various British and foreign vessels, 11 were discovered by vessels striking on them, and 135 were reported by colonial and foreign Governments.

The surveying vessels have all been fully employed, and very satisfactory progress has been made in each survey. 757 miles of coast-line have been charted, and an area of 10,435 square miles has been sounded, the scale of each survey varying according to the requirements of the locality surveyed, while the officers of H.M. ships, other than surveying-vessels, still continue to help by sending in plans and sketch surveys of places which they visit.

Most important work was carried out in the course of the year in all parts of the world. Particular interest attaches to the survey in Chinese waters. This work was carried out by the "Waterwitch," under the command of Lieut.-Commander W. Pudsey-Dawson. It is stated that at Hong-Kong the ship was completed with coal and stores, and she left for Wei-hai-Wei on the 28th June, obtaining soundings during the passage in blank spaces on the coast of China sheets. Wei-hai-Wei was reached on the 4th July, and on the following day a survey of the harbour on a scale of 6 inches to a mile, and of the approaches on a scale of 3 inches to a mile was begun. The survey was continued without interruption, the plan of the harbour being completed by the end of August; and the outer soundings and approaches were then taken in hand and finished at the end of September. A land survey of the west portion of the island Leu-Kung-tau, which will be adapted for naval purposes, and of a site for a rifle range were then taken in hand, and completed by the 26th October. During the progress of the survey boring rods were put down in forty-two positions to ascertain the depth of mud and its consistency in connection with proposals for dredging and the construction of breakwaters.

Latitude and magnetic observations with absolute instruments were obtained at Wei-hai-Wei, and a continuous record of tides was observed by the "Waterwitch" from the 6th July until the 26th October, arrangements being made with the senior officer's ship to continue the series in order that a complete year's tides may be obtained, which will enable tables to be computed for forecasting. Between the 26th October and the 7th November the ship was employed obtaining a meridian distance between Shanghai and the observation spot at Leu-Kung-tau, thus connecting it with the secondary meridian of Shanghai.

Leave was granted at Shanghai, and on the 16th November the vessel sailed for Tinghai; on the following day the survey of the harbour and approaches on a scale of 6 inches to a mile was begun. On the 15th December the triangulation had been finished, and the lower harbour had also been sounded. During the latter part of the time, bad weather having much retarded the work and having now regularly set in, the vessel left for Hong-Kong to refit the ship for the next season's work, and to prepare the fair charts for transmission to the Admiralty, Hong-Kong was reached on the 19th December.

Reference is also made in the report to the Indian marine surveys, which have been carried out under the direction of naval officers. During the year a number of plans of places and sketches of anchorages were furnished by officers of the Navy. The most important of which were :—

A useful and well-executed plan of Corinto Harbour and bar, also soundings off Chicarene Point, Fonseca, by Lieutenants F. Martin Leake, A. K. Jones, and L. W. Browell, and Mr. Dasent, midshipman, "Amphion."

A detailed survey from Point Anderson to Cloates Point, made by Commander L. S. Dawson, R.N., assisted by Messrs. J. P. Stanley, J. Airey, and E. B. Dawson, for the Western Australian Government.

Additions to Port Antonio, West Harbour, by Lieutenant N. Grant, the "Pallas."

A neatly drawn and extensive sketch survey of Port Swatau, China, by Lieutenants C. P. P. Coode and A. E. Ashby, the "Redpole."

Useful additions and corrections from Rocky Point to Wenchau, and to Chemulpho Harbour, by Sub-Lieutenant A. E. House, R.N.

Neat sketch survey, Ocona Anchorage, Peru, by Captain F. F. Fegen, Lieutenant Dannreuther, and Sub-Lieutenant H. W. Longden, R.N., the "Leander."

Valuable tracings of soundings south of Egg Island, Smith Sound; around Ivery Island, Sea Forth Channel; Active Pass and Georgia Strait, Vancouver; also numerous corrections to sailing directions by Captain J. F. Walbran, of the Dominion Government steamship "Quadra."

A neat sketch survey of Maspalomas Anchorage, by Lieutenant F. C. Osborne, assisted by Sub-Lieutenant C. Gotto, R.N., the "Dido."

A neat sketch survey of Mugères Harbour, Yucatan, also a sketch showing additions to Port Antonio, West Harbour, Jamaica, by Lieutenants N. Grant and P. A. Bateman-Champain, R.N.

Sketch survey of Anuda, or Cherry Island, South Pacific, by Lieutenant W. Nunn, R.N., of the "Goldfinch."

Amendments to the Upper Niger between Jebba and Badjibo, by Lieutenant F. W. Melvill, R.N., the "Heron."

A good plan of the Head of Pollensa Bay, Majorca Island, by Commander H. R. Robinson, and the navigating officers of the Channel Squadron.

A well-constructed and carefully drawn plan of Suloga Harbour, Woodlark Island, and approaches, for which the Shadwell prize was awarded, by Lieutenant H. F. I. Rowley, assisted by Lieutenant H. Thompson and Sub-Lieutenant G. D. Jephson, R.N., the "Wallaroo."

Well-made detailed charts, with views and sailing directions, of approaches between Red Head and Motion Head, Western Hauling Arm, White Bay, C. Spear Bay, Motion Head to Bay of Bulls, and a triangulation from North Head to Bay of Bulls, by Lieutenant H. C. Lockyer, assisted by Messrs. Hamilton Gordon, Snagge, Barne, and the Hon. A. L. Strutt, midshipmen, R.N.

Valuable surveys of the lower part of the Wusung River, by Mr. A. M. Bisbee, Chief Inspector, Imperial Maritime Customs.

AUSTRIA-HUNGARY.—*The Manœuvre Squadron*.—The following appointments have been made: Vice-Admiral—Franz Freiherr von Minutello to command of Manœuvre Squadron and the First Division. Rear-Admirals—Alois Ritter von Becker to command of Second Division of Manœuvre Squadron; Rüdolph Graf Montecuccoli-Polimago to command of Third Division.

The squadron has been composed as follows:—

*First Division.*

Coast-defence battle-ships—"Monarch," "Wien," "Buda-Pest."

*Second Division.*

Battle-ships—"Don Juan d'Austria," "Kaiser Max," "Prinz Eugen."

*Third Division.*

Torpedo-cruisers—"Zenta," "Trabant," "Komet," and torpedo-boats "Boa," "Bussard," "Cobra," "Geier," "Kranich," "Marabu," "Weihe," and Nos. 13, 14, 17, 19, 20, 21, and 25.

*Launch.*—The new torpedo-cruiser "Aspern," launched at Pola on the 3rd May, is an improved sister vessel to the "Zenta," being slightly longer, with a heavier displacement. Her dimensions are as follows:—Length, 313 feet 6 inches; beam, 39 feet 4 inches; displacement, 2,437 tons, with a mean draught of 14 feet 6 inches. The engines are to develop 7,200-I.H.P., giving a speed of 20 knots, while her coal supply will give her a radius of 3,600 miles. Her armament will consist of eight 12-centimetre (4·7-inch) Q.F. guns, ten 2-pounder Q.F. guns, and two machine guns, with two torpedo-tubes for 18-inch torpedoes. She has water-tube boilers of the Dürr type and will be wood-sheathed and coppered.

*Boiler Explosion.*—A disastrous accident occurred on Saturday, the 22nd ult., on board the torpedo-boat "Adler," which was cruising off Torcola Island on the Dalmatian coast, training carrier pigeons, through the bursting of her boiler, by which one officer, three engineers, and a stoker lost their lives, and two others were injured. The "Adler" is a vessel of 95 tons, and 22 knots speed, built at Poplar in 1886, and it is believed that the explosion is due to an undiscovered flaw in the boiler. Prior to the cruise the vessel had been subjected to a careful official inspection, while the work on which she was engaged did not necessitate a high rate of speed. The machinery is said to be uninjured, and that she will be quite fit for service when fitted with a new boiler.

Another torpedo-boat, the "Bussard," has also been unlucky, as she came into collision with the "Monarch" during some manœuvre, and had to be towed back to Pola.—*Militär-Zeitung.*

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CHINA.—The "Hai Tien," of which we give a photograph in our frontispiece, is a protected cruiser built for the Imperial Chinese Government by Sir W. G. Armstrong, Whitworth & Co., Ltd. at their Elswick Yard, Newcastle-on-Tyne, which was launched on November 25th, 1897, and sailed from the Tyne 14th May, this year, for Chinese waters.

The following are her principal dimensions, etc.:—Length between perpendiculars, 396 feet; beam, 46 feet 8 inches; draught, mean, 16 feet 9 inches; displacement in tons, 4,300. Provision is made to enable the vessel to carry 300 tons of coal in her normal condition, and 1,000 tons with bunkers full. The vessel has a protective deck, varying in thickness from 5 inches to 3 inches on the slopes, and 1½ inches on flats and ends. The conning-tower is 6 inches in thickness.

The machinery is of the twin-screw vertical triple-expansion type, constructed by Messrs. Hawthorn, Leslie & Co. The boilers are of the cylindrical type and are eight in number (four double and four single-ended) with a total heating surface of 27,558 square feet and a total grate area of 940 square feet, working at a pressure of 155 lbs. per square inch. The speed trials of the "Hai Tien," recently conducted off the mouth of the Tyne, gave the following remarkable results. During a run of six hours' duration, with open stokeholds, six runs being taken on the measured mile, the speed obtained was 22·64 knots, the I.H.P. developed being 12,000. The speed attained during the forced-draught trials was 24·1 knots, with a developed power of 17,000.

The armament consists of:—Two 8-inch B.L. guns, one placed forward and the other aft, on the upper deck; ten 4·7-inch Q.F. guns on the upper deck; twelve 3-pounder Q.F. guns (four on main deck and eight upon bulwarks on upper deck); four 37-millimetre Maxims upon the shelters, and six Maxims in the military tops; five torpedo-tubes, one fixed in the bow and three training on each side upon lower deck.

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FRANCE.—The following are the principal promotions and appointments which have been made: Rear-Admirals—Gigault de la Bédollière to Vice-Admiral; E. M. Escande to command of Division of Coast-Defence Vessels at Toulon; C. A. Mallarmé to command of Division of Coast-Defence Vessels at Toulon.



Capitaines de Vaisseau—R. J. Marquis to be Rear-Admiral; E. A. Pailhès to command of Submarine Defences at Brest. Capitaines de Frégate—E. M. Surcouf, A. A. Bellot, H. le Nepvou de Carfort to Capitaines de Vaisseau; A. F. Coffinières de Nordeck to "Suchet"; M. J. Ytier to "Héroïne"; A. M. Poidlouë to command of Défense-Mobile at Brest; J. P. Bouthet des Gennetières to command of Défense-Mobile at Tunis; R. P. le Moine des Mares to "Dunois"; E. A. Serres to be Chief of the Staff to Rear-Admiral Mallarmé.—*Le Journal Officiel de la République Française.*

*Personal.*—Rear-Admiral Escande hoisted his flag on board the "Bouvines" in command of the Coast-Defence Squadron at Toulon on the 16th ult.; he only retains the command for six weeks to enable him to qualify for promotion to vice-admiral, and he will be succeeded by Rear-Admiral Mallarmé, who will hoist his flag on board the "Bouvines" on the 1st September. Rear-Admiral Marquis, who has just received his promotion to that rank, is only just fifty-three years of age, and is the youngest rear-admiral on the list. The two junior vice-admirals—Dieulouard and Gigault de la Bedollière—who have been promoted to that rank during the last two months are both over sixty-one.

According to *La France Militaire* the following is the proportion of admirals and generals among the officers in the French Navy, Army, and Marines to the men. The figures are as follows:—In the Navy, 45 admirals, 1,760 officers, 41,536 men; in the Army, 330 generals, 21,488 officers, 540,000 men; in the Marine Artillery, 5 generals, 536 officers, 7,796 men (6,605 Europeans and 1,191 natives); in the Marine Infantry, 12 generals, 1,569 officers, 44,509 men (24,389 Europeans and 20,120 natives). The proportion, therefore, of officers to one general or admiral is as follows:—Navy, 39.11; Army, 65.10; Marine Artillery, 107.2; Marine Infantry, 130.75. As a further instance of this inequality it may be mentioned that in Algeria there is 1 general to 2,972 men, in Tunis 1 to 4,266 men, the troops in both these cases belonging to the Army, while in West Africa and Indo-China, where Marines only are employed, the numbers are 1 to 7,000 and 1 to 13,500 respectively.

*Duties of the Chief of the Staff of the Navy.*—By a Presidential Decree of the 18th ult., the duties of the Chief of the Staff have been defined anew:—

- Art. 1. The Chief of the General Staff of the Navy is directly responsible for everything connected with the preparation of the fleet for war, and in especial for the manning and mobilisation.
- " 2. In the absence of the Minister, he is authorised to sign all documents, where the law does not directly require the signature of the head of the Department.
- " 3. He is to take part with a deliberative voice in all councils and committees of the Department, and in the absence of the Minister he is to preside.
- " 4. He has under his immediate orders the flag-officers and others forming part of the General Staff of the Navy, and he can call for all reports which he may require; the officers specially attached to the staff of the Minister are also placed under his orders.
- " 5. He is to prepare lists of all officers of every rank for promotion, decorations, commands, and appointments, and submit their names to the Minister, including those he may think fit for appointment for service at the Ministry of Marine or as Naval Attachés at foreign Courts.
- " 6. He is to direct personally the duties of the General Staff, and he will have to assist him a sub-chief of the General Staff of the rank of flag-officer, who will be appointed by decree.

- Art. 7. Every proposal relating to the military affairs of the Department is to be submitted to the Chief of the Staff for his endorsement.
- „ 8. A Ministerial Decree fixes the number and composition of the different sections of the General Staff, regulates the duties of each, and settles the numbers of officers and officials attached to each, with the minimum time that officers are to be appointed for duty at the Ministry.

The new regulations do not seem to be altogether approved of in the Navy. The *Yacht* complains that they are too vague, and that it is impossible to say whether the duties of the Chief of the Staff have been extended or not; but that it certainly looks as if there was a tendency to increase the authority and responsibility of the Chief of the Staff at the expense of the Minister. It is absolutely opposed to good administration to place all the power in one hand, while the responsibility is in another—a state of things which the administrative organisation and national character will not permit to continue; although, in the actual state of politics, it is possible that a Chief of the Staff with the control of the Navy in his hand may palliate to a certain extent the evils which may arise from the instability and sometimes even the incompetence of a Minister. Against this, however, must be set the fact that the position of a Chief of the Staff is no more stable than that of a Minister, and that every Minister is sure to choose an officer for his Chief of the Staff whom he can depend upon for carrying out his views.

*General.*—It is reported that the small squadron of cruisers forming the division of the “*École Supérieure de la Marine*” may be broken up, in consequence of the paucity of the number of officers who are applying to go through the course, the expense of maintaining the squadron being out of all proportion to the results obtained.

The old battle-ships “*Trident*,” “*Richelieu*,” “*Colbert*,” “*Friedland*,” and “*Du Guesclin*” have been placed in a special class of the Second Category of the Reserve at Toulon. It had been previously arranged that these ships should be struck off the effective list of the Navy, but it is now considered some use might be found for them in war-time. All the ships have powerful armaments, but the first three on the list have wooden hulls.

An accident happened to the “*Courbet*,” one of the battle-ships of the Northern Squadron, while at Cadiz, of a rather unusual character. She was apparently moored in too shallow water, and in swinging touched one of her anchors, or more probably another ship's anchor, the fluke of which penetrated the bottom on the starboard side, filling one of the double-bottom compartments with water, and she returned to Brest carrying about 65 tons of water. The damage has since been made good.

*Steam Trials.*—The new torpedo-boat destroyer “*Hallebarde*” arrived at Cherbourg on the 13th ult. from Harve for her trials; she averaged 25 knots on the trip round. She was commissioned on the 17th ult. with a reduced complement, and has since made her first run successfully at 14 knots to test her coal consumption, the consumption being well under the contract conditions. A sister vessel, the “*La Hire*,” also commissioned at Cherbourg on the 1st ult. with reduced complement for her trials.

The torpilleur-de-haute-mer “*Téméraire*” has commissioned for fishery service off the Algerian coast; while on her trials, steaming 19 knots, two tubes of one of her boilers gave way, but they were removed and replaced without difficulty; her boilers are on the Niclausse system.

The new third-class cruiser “*D'Estrées*,” which was to have come to Brest for her trials, is now to make them at Rochefort, where she was built.

*Training-School for Stokers.*—The Minister of Marine has given directions that a training-school for stokers on board torpedo-boats should be organised at Brest

on a similar footing to the one at Toulon. This step is a wise one, as the bulk of stokers for the Navy are drawn from Brittany. For the purpose of the school the torpilleur-de-haute-mer "Corsaire," now acting as tender to the training-ship "Borda," will be attached to the *Défense-Mobile* of the port and with the torpilleur-de-haute-mer "Vélocé," which also belongs to the *Défense-Mobile*, will be temporarily lent for service with the new school, which will have a special *personnel*, and be under the command of a lieutenant. The new organisation will ensure a more rational and methodical system of training in stoking than has hitherto been the case.

*Movements of Ships during Present Quarter.*—*Cherbourg.*—The torpedo-boat destroyer "Dunois" commissioned on the 5th ult., and is expected to leave shortly for Toulon, where she will replace the torpedo-boat destroyer "Léger," which will be transferred to the Coast-defence Squadron. The torpedo-boat destroyer "Lancier" will be detached from the Squadron of the North in September and placed in the Second Category of the Reserve, her place being probably taken by the "Hallebarde."

*Brest.*—The first-class battle-ship "Charlemagne" it is hoped will at last be definitively commissioned in September for the Mediterranean; the second-class cruiser "Suchet" commissioned on 3rd ult. to replace the "Sfax" in the Atlantic Division.

*Rocheport.*—The first-class gun-boat "Gabès" will pay off in October from the East Indies.

*Toulon.*—On the arrival of the "Charlemagne" she will relieve one of the battle-ships of the Active Squadron, not yet settled, which in turn will relieve one of the ships in the Instructional Squadron, which will in its turn be paid off into the Second Category of the Reserve. The torpilleur-de-haute-mer "Téméraire" has commissioned for fishery duties in Algeria.

*The "D'Entrecasteaux."*—Many complaints from officers and men serving on board the new first-class cruiser "D'Entrecasteaux," which arrived at Saigon on May 12th, have been received, from which it appears that this fine new vessel has not come up to all the expectations which were formed about her. Her arrangements are very defective, the accommodation is more than confined, and the crew is literally roasted on board. The "D'Entrecasteaux," says one letter, is a misfit which the authorities sent off from Toulon in despair of their ever being able to render her habitable or good for anything at all. She is as hot as a furnace, and from a naval point of view such a failure that it has been necessary to remove the powder from the magazines, where a temperature of 113° Fahr. (45° C.) is usual. On the departure of the ship the captain called attention to this, and the *Petit Var* stirred up, and with reason, an agitation on the state of affairs; but M. Lockroy, for whom everything was for the best since he had become Minister, gave orders for her to leave all the same.

*New Torpedo Apparatus.*—The *Italia Marinara* describes a new apparatus which has been invented recently by an ex-torpedo officer of the French Navy, with the object of enabling a ship to have timely warning of the dangers threatened by shoaling water, or by collision with an approaching vessel. The apparatus itself is called the "torpedo scout," and is said to resemble an automatic torpedo of the Whitehead type, but of reduced dimensions, measuring 4½ metres in length and 40 centimetres in diameter. Instead, however, of the explosive charge carried by the Whitehead, the torpedo-scout carries a motor apparatus, which is worked by electricity, and is connected with the ship by wires, which transmit sufficient energy from it to keep the torpedo-scout travelling in advance at a slightly higher rate of speed. In the nose of the torpedo is a striker, the shaft of which slides inside a metallic tube as in a sheath, and which, on touching a reef, the side of a ship, or an obstacle of any kind, slides back, presses

on a spring, and thus closes the circuit of an electric apparatus on board the vessel, with which it is connected, giving an alarm. The torpedo-scout is said, also, to be furnished with an appliance which automatically regulates the depth of immersion.

*Launches.*—The first-class battle-ship "Suffren" was successfully launched at Brest on 25th July in the presence of Admiral Barrera and the civil and military authorities, the religious ceremony being performed by Monseigneur Oury, Archbishop of Algiers. Between the dates of laying the keel and launching exactly 190 days have elapsed, less than six and a half months, but when she took the water she was a mere shell, although it is hoped to complete her by July, 1901. If these dates are observed, the period of her construction will be 31 months, which will be less than any other French battle-ship hitherto built; she is also the largest battle-ship built by the French up to the present, her tonnage displacement being 12,728. The other dimensions are:—Length, 125·5 metres (411 feet); beam, 21·36 metres (69 feet); draught, 8·4 metres (27½ feet). She will have three propellers driven by vertical triple-expansion engines, and water-tube boilers of a collective H.P. of 16,200, giving an estimated full speed of 18 knots. The normal coal supply will be 820 tons, which can be increased to 1,150 tons. With normal stowage her radius of action will be 5,100 at 10 knots, and 1,100 miles at full speed, and with the extra coal these distances are increased to 7,000 and 1,800 miles respectively. The hull at the water-line is protected from end to end by a Harveyized steel belt with a maximum thickness of 300 millimetres (11·8 inches), extending to a height of 1·10 metres (3·6 feet) above the water-line. Armour to a height of 2 metres (6·5 feet), 130 millimetres (5·1 inches) thick protects the battery for the Q.F. guns on the upper deck, which, as in the "Charlemagne" and her sisters, has the defect of leaving a considerable extent of side between the lower belt and the upper deck exposed without protection to shell-fire. There is also an armoured deck 70 millimetres (2·7 inches) thick at the top of the belt. The armament is entirely protected by armour and consists of:—Four 305-millimetre (12-inch) guns in pairs in the two turrets forward and aft in the midship line; ten 164-millimetre (6·4-inch) Q.F. guns, four of which are mounted in the battery and six in turrets above the battery; eight 100-millimetre (3·9-inch) guns; twenty 47-millimetre (1·8-inch) guns; two 37-millimetre (1·4-inch) guns; and four torpedo-tubes, two of which are submerged. The plans of the "Suffren" are by M. Thibaudier, and her cost will be 29,492,887 francs (£1,179,715 10s.).

The launch of the submarine torpedo-boat "Morse" took place at Cherbourg on 4th July. The "Morse" is of the same type as the "Gustave Zédé," but rather smaller. Her dimensions are:—Tonnage, 146 tons; length, 36 metres (118 feet); beam, 2·75 metres (7 feet). She has a single propeller driven by an electric motor and accumulators; her estimated speed is 13 knots. She is to carry one torpedo-tube and a crew of 1 officer and 8 men. Her cost is 648,000 francs (£25,920). Her plans are by M. Romazzotti (first-class chief engineer).

*Balloon Experiments.*—Trials of the visibility at sea of a captive balloon worked from a ship have been made in the Mediterranean Squadron. The balloon ascended from the "Jauréguiberry," which was at anchor at Salins d'Hyères to a height of 400 metres (1,312 feet), and the point to be ascertained was whether the balloon could be seen at long distances and would thus betray the presence of the ship or squadron making use of it. The balloon was illuminated by the projectors of the "Carnot," from which ship observations were taken at different distances, and it was found that up to the distance of 20 miles the balloon was visible, but not beyond. At the close of the experiments the balloon was allowed to ascend to an altitude of 3,500 metres (11,482 feet), when, by some accident, the attaching cable broke. The officer in the car, Lieutenant Gaillard, was making his first ascension, but he skilfully made the balloon descend and anchored it with



the special anchor supplied for the purpose, and awaited in safety the arrival of a torpedo-boat sent to his assistance.—*Le Temps, Les Tablettes des deux Charentes, and Le Moniteur de la Flotte.*

GERMANY.—The following are the principal promotions and appointments which have been made: Admiral—Koester to command of the Grand Manœuvre Fleet. Vice-Admiral—Karcher to be Admiral. Rear-Admirals—Hoffmann to command of Second Squadron of Manœuvre Fleet, and First Division of same; Freiherr von Bodenhausen to command of Second Division of Second Squadron; Bendemann to be Chief of the Staff at the Ministry of Marine. Kapitän zur See—Brensing to be Chief of the Staff to Admiral Koester during the Manœuvres, and for service at the Ministry of Marine; von Eickstedt for service at the Ministry of Marine; Ascher to "Mars"; Freiherr von Maltzahn for service on the staff of Admiral Koester during the Manœuvres. Fregatten-Kapitän—Schroder to Kapitän zur See; Pohl to "Hansa"; Bachem to "Ægir"; Pustau to "Hildebrand"; von Heeringen to "Siegfried."—*Marine-Verordnungsblatt.*

*Personal.*—Admiral Karcher hoisted his flag at the main at Wilhelmshaven on the 1st July on promotion to full admiral. The second-class cruiser "Hertha" has arrived in China, and Rear-Admiral Fritze has shifted his flag to her from the first-class armoured cruiser "Kaiser," which has left for home.

*The Manœuvres.*—The Manœuvre Fleet this year is composed as follows:—First Squadron, under the command of Vice-Admiral Thomsen.

*First Division:—*

First-class battle-ships—"Kurfürst Friedrich Wilhelm" (flag-ship of Commander-in-Chief), "Brandenburg," "Weissenburg," "Wörth."

*Second Division:—*

Third-class battle-ships—"Baden" (flag-ship of Rear-Admiral von Wietersheim, second-in-command), "Baiern," "Sachsen."

Second Squadron, under the command of Rear-Admiral Hoffmann.

*First Division:—*

Fourth-class coast-defence battle-ships—"Hildebrand" (flag-ship of Commander-in-Chief), "Siegfried," "Beowulf."

*Second Division:—*

Fourth-class coast-defence battle-ships—"Ægir" (flag-ship of Rear-Admiral von Bodenhausen, second-in-command), "Oden," "Frithjof."

*Scouting Division:—*

Torpedo-avisos—"Hela," "Greif," "Wacht," "Blitz."

First torpedo-boat flotilla, under the command of Korvetten-Kapitän Bruch.

Division-boat D 8 (senior officer's pennant).

*Division A.*

Division-boat D 7; torpedo-boats Nos. 55, 59, 60, 61, 62, 63, 64, and 65.

*Division B.*

Division-boat D 6; torpedo-boats Nos. 45, 50, 51, 52, 53, 54, 55, 56.

Second torpedo-boat flotilla under the command of Korvetten-Kapitän Koch.

Division-boat D 5 (senior officer's pennant).

*Division C.*

Division-boat D 10; torpedo-boats Nos. 82, 83, 84, 85, 86, 87, 88, 89.

*Division D.*

Division-boat D 2; torpedo-boats Nos. 74, 75, 76, 77, 78, 79, 80, 81.

Reserve armoured gun-boat Division, under the command of Korvetten-Kapitän Deubel.

Armoured gun-boats—"Skorpion," "Natter."

The special-service ships "Pelikan," the fishery-cruiser "Zieten," and the training-ship "Grille."

Admiral Koester will hoist his flag on board the torpedo training-ship "Blücher" in command of the fleet on the 15th inst., which will assemble off Neufahrwasser in the Bay of Danzig, and on the 17th and 18th he will inspect the ships of the First Squadron and First Torpedo-boat Flotilla, and on the 19th the ships of the Second Squadron and Second Torpedo-boat Flotilla. On Sunday, the 20th, the Fleet Regatta will take place, when the cup presented by the Kaiser will be competed for. From the 21st to the 25th August the fleet will be exercised in tactics, proceeding on the 26th to Neufahrwasser, where they will coal; on the 27th, 28th, 29th, the fleet will again be exercised in tactics, and the torpedo-flotilla will attack the squadron under varying conditions; the fleet will anchor at Kiel on the evening of the 29th; on the 30th August the First Squadron will be inspected at target practice, and on the 31st the fleet will coal. On the 1st September the fleet leaves Kiel for the North Sea, proceeding through the Great Belt and tactics will again be practised, including scouting and long-distance signalling; on the 7th the fleet anchors at Wilhelmshaven and coals on the 8th. On the 9th the squadrons take up their positions for the final Grand Manœuvres, which will last from the 10th to the 15th, when the fleet will proceed to Kiel through the Kaiser-Wilhelm Canal and be broken up on the 16th.

*Steam Trials.*—The new second-class cruiser "Victoria-Luise" has completed her trials successfully, having averaged 19.1 on her run under forced draught, the stipulated contract speed for her and her sister ships being 19 knots; she is to pay off now at Wilhelmshaven, to repair the damage to her stern post received when she took the ground in the Jahde; her crew are to proceed to Danzig where they will commission a sister ship, the "Freya," for her trials. The third-class battle-ship "Sachsen" having completed her trials, when she averaged 14.5 on her full-speed run has joined the Second Division of the First Squadron; all three ships of this division are now modernised and have been provided with water-tube boilers on the Dürr system; the fourth ship (the "Württemberg") is still in the dockyard hands.

*Work in the Dockyards.*—Rapid progress has been made at Wilhelmshaven with the reconstruction of the third-class battle-ship "Württemberg." Among other changes one large funnel amidships has been substituted for the four funnels she used to carry, and with the exception of her hull but little of the original ship is left; all wood has been done away with, the decks being covered with a preparation of asbestos; her reconstruction will cost some 2,600,000 marks, and for the last 18 months some 1,000 men have been at work upon her; overtime is now being worked, and it is hoped she will be ready for her trials by the end of September. At Kiel the sea-going cadet training-ship "Stein" is undergoing repairs and has received new boilers; among other alterations the two after 15-centimetre guns in her main-deck battery have been removed to make more room for the cadets, and she will now only carry eight of these guns. At Danzig the construction of the two new gun-boats Ersatz "Wolf" and Ersatz "Habicht" is being pushed on, and it is expected that the first-named will be launched during the current month; as soon as she leaves the slip the keel of a new fourth-class cruiser of the "Gazelle" type of 2,650 tons is to be laid down. The fourth-class cruiser "Seedler," which is under repairs at the same yard, is to be pushed on to completion as soon as possible, as she is required for foreign service.

*The Effective Strength of the Fleet.*—According to the latest return issued from the Ministry of Marine, dated April, 1899, the strength of the Officers' Corps stands as follows:—Flag-officers, 16; officers of the military branch, 811; marine infantry, 40; engineers, 128; doctors, 142; ordnance officers, 57; torpedo officers and torpedo engineers, 41; paymasters, 104; pensioned officers doing duty, 26; total, 1,365. Midshipmen, 207; cadets, 120; total, 372. Warrant officers, petty officers, seamen, and boys:—Warrant officers, 1,058; petty officers, 4,740; bluejackets, 17,597; bandsmen, 173; sick-pay staff, 216; clerical staff,

140; mechanics, 152; boys' instructors and boys, 1,000; total, 25,076. Included in the above are the two seamen brigades of two divisions each and a boys' division; total, 11,589; the two dockyard divisions of five companies each, 6,927; the two torpedo divisions, 2,692; the four seamen-artillery divisions, 2,202; the two marine battalions of four companies each, 1,201; and finally, the military *personnel* of the torpedo staff, 110; the submarine mining staff, 58; the surveying, 18; and the clothing departments, 168; making a grand total of officers and men, 26,768.

The number of effective ships on the same date was:—Battle-ships, 11; coast-defence armoured ships, 8; armoured gun-boats, 13; large cruisers, 10; small cruisers, 23; gun-boats, 3; training-ships, 16; special service-ships, 13; with a total displacement of 326,701 tons and 399,030-I.H.P.

*Increase in Ships' Complements.*—The increased armament of ships due to the introduction of the Q.F. guns has necessitated a corresponding increase in the complement of ships. The crews of the four battle-ships of the "Sachsen" class have been increased from 390 to 440 men. The four battle-ships of the "Brandenburg" class have complements of 575, and the eight coast-defence vessels of the "Siegfried" class complements of 285 men. But the new battle-ships of the "Kaiser Friedrich III." class will have a complement of 650; the large cruisers of the "Fürst Bismarck" class, 570; the five cruisers of the "Freya" class, 460; the small cruisers of the "Gazelle" class, 211; the new gun-boats of the "Iltis" type, 121; the new division torpedo-boats, 40; and the torpedo-boats, 20 men.

*Change of Title.*—The Kaiser, wishing as far as possible to do away with all words derived from foreign languages, lately issued an order making the following modifications in the titles of the following ranks in the Navy:—

<i>Old Title.</i>	<i>New Title.</i>	
Kadett	Seekadett	Cadet
Seekadett	Fähnrich zur See	Midshipman
Unterlieutenant zur See	Leutnant zur See	Sub-lieutenant
Lieutenant zur See	Oberleutnant zur See	Lieutenant
Kapitänlieutenant	Kapitänleutnant	—

—*Neue Preussische Kreuz-Zeitung and Marine Verordnungsblatt.*

*JAPAN.—Launches.*—On Saturday the 8th ult. the new first-class armoured cruiser "Yakumo" was launched from the Vulcan Company's Yard at Stettin. Her dimensions are as follows:—Length, 407 feet 9 inches; beam, 64 feet 4 inches; mean draught, 23 feet 9 inches, with a displacement of 9,850 tons. The boilers will be water-tube of the Belleville type and her engines are to develop 11,200-I.H.P., under natural draught, giving a speed of 18 knots, and 16,000-I.H.P. under forced draught, giving a speed of 20 knots. Her normal coal supply will be 600 tons, giving a radius of action of 5,000 miles at 10 knots, but 1,100 tons can be carried when necessary, which will give a radius of action of nearly 10,000 miles at economical speed. Protection will be afforded by a complete armour water-line belt of hardened steel with a maximum thickness of 7 inches, tapering to 3·5 inches at the extremities; while the armour on the two turrets for the heavy guns and the casemates for the 6-inch Q.F. guns will be of 6-inch steel, also hardened by the Krupp process, and the armoured deck 2·5-inch steel. Her armament, which is to be supplied by the Elswick firm, will consist of four 8-inch Q.F. guns, two in each turret, one forward and one aft; six 6-inch Q.F. guns in casemates; twelve 12-pounder and seven 2·5-pounder Q.F. guns, with five torpedo-tubes, one above water in the stem and the other four submerged.

We shall on another occasion give full details of the first-class battle-ship "Hatsuse," which was launched from the building yard of Sir W. Armstrong & Co., at Elswick, on the 27th June.

*Trial Trips.*—A most successful steam trial was lately made by the "Akebono," one of the six torpedo-boat destroyers constructed by Messrs. Yarrow & Co., of Poplar.

The "Akebono" is 220 feet long and 20 feet 6 inches wide. She is built of galvanised steel containing a proportion of nickel. This alloy gives greater stiffness to the material, its tensility or tensile strength per square inch of section being 40 tons. It may here be said that the use of nickel as an alloy in steel is at the present time receiving a good deal of attention at the hands of engineers. Unfortunately the metal is dear. The Japanese destroyers have a wide radius of action owing to the large bunker space, there being storage capacity for 100 tons of coal. The crew are berthed forward, the officers' accommodation is immediately abaft the machinery space, while the warrant and petty officers are right aft. The armament consist of two 18-inch swivel torpedo-tubes, one 12-pounder, and five 6-pounder Q.F. guns. The vessel is propelled by twin-screws actuated by two sets of triple-expansion engines, each having four cylinders of 20½ inches, 31½ inches, and 34 inches in diameter for the high, intermediate, and low-pressure cylinders respectively, there being two low-pressure cylinders to each set. The stroke is 18 inches. These engines are balanced on the Yarrow, Schlick, and Teedy principle, and run with remarkable smoothness, the absence of vibration at all speeds being specially noticeable. The boilers are four of the Yarrow water-tube type, and they supply steam at a pressure of 230 lbs. to the square inch. Each weighs when full of water not more than 18 tons, although it will make steam for 1,600-I.H.P. On her full-speed trial the "Akebono" made 31.159 knots with an air pressure in the stokehold of from 1½ inches to 1¾ inches. This is what might be called "easy steaming" for the boilers.

It is stated that when these six destroyers have been added to the Japanese Navy Japan will possess a flotilla superior in speed to that of any similar number of craft in any other Navy.

The "Suzanami," a sister vessel, has also completed her trials, making an average of 31.3 knots. The "Ikadsuchi" the first of the six to be completed, which has already arrived in Japan, also maintained a mean speed of a little over 31 knots on her trials, as did the "Madsuma," which is at present *en route* to the East.

The torpedo-boat destroyer "Shinonome" (Daybreak), recently launched from the yard of Messrs. John I. Thornycroft & Co., of Chiswick, also for this Government, has successfully undergone a full-speed official trial at the Maplin Sands. The contractors guaranteed a speed of 30 knots when carrying a load of 35 tons, and the results obtained on a recent trial were 30.513 knots as a mean of six runs over the measured mile, and a speed of 30.229 knots was maintained during three hours' continuous steaming.

*Trial of Armour Plates.*—At the Ridsdale proving ground of Messrs. Sir W. G. Armstrong, Whitworth & Co., Ltd., a trial took place recently of a plate representing the armour of the Japanese battle-ship "Asahi," now building on the Clyde by the Clydebank Engineering and Shipbuilding Company, Ltd. The makers of the armour are Messrs. John Brown & Co., Ltd., of Sheffield, and the trial plate, 8 feet by 8 feet and 8.8 inches thick, was cut from a partially finished belt plate selected by the Japanese authorities from among those in course of manufacture. The attack consisted of three blows from 8-inch armour-piercing shot of 250 lbs. weight, made for the Japanese Government by Messrs. Armstrong on the Wheeler-Stirling process. The striking velocities of the three rounds were respectively 1,859, 1,964, and 2,039 foot-seconds, and all the shots were smashed to pieces without indenting the plate beyond an estimated depth of 3 inches. Except for a few very fine hair-cracks in the face, and the usual splintering of the surface round the point of impact, no other damage was



apparent. On later examination the back was found intact except for three slight bulges, of which the most prominent did not exceed  $1\frac{1}{2}$  inches in height.—*Résumé from Times and other sources*

NORWAY.—The Norwegian Naval Estimates for 1899-1900 amount to a total of 3,894,602 kronen (1 krone = 1s.  $1\frac{1}{2}$ d.), of which the following are the principal items:—Pay, 902,500 kronen; education and training, 263,000 kronen; fitting-out and trials of ships, 409,500 kronen; new constructions, 590,000 kronen; ships in commission, 254,600 kronen; gunnery service, 100,000 kronen; torpedoes, 75,250 kronen; dockyard vote, 198,300 kronen; light-houses and coast services, 754,767 kronen, etc.

On the 9th January of this year the Norwegian Minister of Marine signed a contract with the Elswick firm for the construction of two small armoured ships, which are to be completed in 20 months. The dimensions of the ships are to be as follows:—Length, 290 feet; beam, 50 feet 6 inches; displacement, 4,500 tons, with a draught of 16 feet 6 inches. The ships will be built of steel, and the use of wood is as far as possible to be avoided; where its use is absolutely necessary, it is to be so arranged that it can be thrown overboard before an action. Protection is afforded by a water-line belt of Krupp nickel steel, 8 inches thick, tapering to 4 inches at the extremities, while the coamings of the funnels and hatchways are also to be armour-protected, and the ammunition hoists, speaking tubes, electric tubes, etc., are all to be protected by armour tubes. The armour of the conning-tower will be 6 inches thick, that of the two turrets for the heavy guns 8 inches, and that of the casemates 5 inches, all of nickel steel treated by the Krupp process. The armament will consist of two 21-centimetre (8·2-inch) 45-calibre guns in turrets, one forward and one aft; six 15-centimetre (6·2-inch) 45-calibre Q.F. guns in casemates, eight 6-pounder and six 1-pounder Q.F. guns, with two submerged torpedo-discharges for the 18-inch torpedoes. Four of the 15-centimetre guns will be mounted at the corners of the central casemate, so as to command an end-on fire ahead and astern respectively, and the remaining two will be mounted on the beam. The engines are to develop 4,500-I.H.P., giving a speed of 17 knots, the boilers being of the Yarrow water-tube express type.—*Marine Rundschau nach Tidsskrift for Sjøvesen.*

SWEDEN.—*New Ships.*—Towards the end of last year the first keel plate of the new coast-defence battle-ship "Dristigheten" was laid at the Lindholm Yard at Gothenburg, for the Swedish Navy; she is slightly larger than her predecessors the "Thor" and "Njord," which were both launched last year from the same yard. Her dimensions are as follows:—Length, 285 feet 6 inches; beam, 49 feet 3 inches; displacement, 3,500 tons, with a mean draught of 16 feet. The engines are to develop 5,000-I.H.P., giving a speed of 16 knots; the boilers, which are of the Yarrow water-tube type, are being constructed at the Motala Engine Works. Protection is afforded by a complete water-line belt of nickel steel 8 inches thick, but tapering to 4 inches at the extremities; the conning-tower is similarly protected, while the armour on the turrets for the heavy guns is 8 inches in front tapering to 6 inches in rear, while the casemates for the secondary battery are of 5-inch steel; all the armour is being made by the French firm of St. Chamond. The armament will consist of two 21-centimetre (8·2-inch) guns, one forward and one aft in turrets and six 15-centimetre (5·9-inch) Q.F. guns in a central battery amidships, with ten 5·7-centimetre (2·2-inch) and four 3·7-centimetre (1·4-inch) smaller Q.F. guns, and two submerged torpedo-tubes for 18-inch torpedoes on the broadside; all the guns are being made at the Bofors Works. The two torpedo-cruisers "Claes Ugge" and "Psilander," building at the Bergsund Works, Stockholm, are of the same type as the "Ornen," but the engines are to develop 500-I.H.P. more, which will give them a knot extra speed; their dimensions are

as follows :—Length, 223 feet ; beam, 27 feet 6 inches, with a displacement of 670 tons on a mean draught of 8 feet 9 inches. The engines are to develop 4,500-I.H.P., giving a speed of 21 knots ; the boilers are of the Yarrow water-tube type ; and the vessels are to be completed for sea this year.

The new first-class torpedo-boat "Stjerna," building by the Schichau firm at Elbing, is now ready for her machinery ; she is one of seven of an identical type, their dimensions being as follows :—Length, 128 feet ; beam, 15 feet 9 inches ; engines developing 1,056-I.H.P., giving a speed of 23 knots ; while their armament consists of two 3-pounders and two torpedo-tubes ; the "Orkan," "Bris," and "Vind," three others of the class, are approaching completion at Carlsrona. Two more first-class torpedo-boats and two second-class are also to be commenced during the year.

*Reconstruction of Old Ships.*—Instead of laying down another new battle-ship, the Minister of Marine, in view of the experience gained in the late wars, has decided it is better to modernise the three old armour-clads "Svea," "Göta," and "Thule." A Commission of five members—three being naval officers and two engineers—was appointed, who reported on the 17th December of last year. They formulated the lessons learnt from the late wars as follows :—

1. Q.F. guns of medium calibre have, if protected by armour, an indisputable importance in action.
2. Q.F. guns of small calibre are effective against unarmoured portions of a ship and insufficiently protected guns' crews.
3. Heavy guns can, relatively speaking, be depended on to make only a small percentage of hits.
4. The use of wood on board ships adds materially to the dangers of fire.
5. Torpedoes in unprotected above-water tubes become a source of danger to the ship herself.
6. Care should be taken that the fire-quenching apparatus should be kept in an efficient condition during action.

The proposals of the Commission are as follows :—

In place of the two 25-centimetre (10-inch) guns with their turrets to substitute one 21-centimetre (8·2-inch) and seven 15-centimetre (5·9-inch) Q.F. guns in balanced revolving turrets, and eleven 5·7-centimetre (2·2-inch) small Q.F. guns. The guns to be so mounted that the 21-centimetre gun and four of the 15-centimetre Q.F. guns can fire right ahead, and five of the 15-centimetre Q.F. guns can fire right astern. That the turret for the 21-centimetre gun should be similar to that adopted for the "Oden." That the ammunition for all guns should be brought up through armoured tubes. The unprotected above-water torpedo-tubes to be done away with, as it is not possible to find a place where they can be properly protected, but on account of the excessive cost it is not proposed to substitute submerged broadside tubes. The military masts to be done away with and two light signal masts to be substituted, the forward one to be of iron fitted with a look-out place, and the after of wood. In place of the four 24-inch Mangin search-lights, two 36-inch and two 21-inch Schuckert projectors to be fitted on the superstructure. Iron to be substituted as far as possible for wood. The fire-quenching arrangements to be so fitted that as much protection as possible shall be given to the pipes, and the water is to be supplied by special pumps. The coal supply of the "Svea" and "Thule" to be increased by 50 tons, the cork protection in the "Svea" being done away with ; but as the "Göta" is fitted to carry an admiral and his staff, it does not seem possible to increase her coal stowage.

The Minister of Marine having, considered the proposals of the Commission, has determined to retain one 25-centimetre gun in place of the 21-centimetre gun recommended by the Commission, but approves of the other proposals, the cost of which will amount to 4,920,000 kronen, of which 2,500,000 will be expended in 1900 and the balance in 1901.—*Marine Rundschau nach Tidsskrift for Sjøvæsen.*

## MILITARY NOTES.

### PRINCIPAL APPOINTMENTS AND PROMOTIONS DURING JULY, 1899.

Brevet Colonel W. H. Moberly to be Colonel to command the 37th Regimental District. Brevet Colonel H. R. Mends to be Colonel to command the Rifle Depot. Lieut.-Colonel W. E. Saunders, C.B., R.A.M.C., to be Colonel. Colonel C. C. Egerton, C.B., D.S.O., A.D.C., I.S.C., to command a 1st Class District in India, and to have the local rank of Major-General whilst so employed. Colonel G. Henry to be Colonel on the Staff in India. Lieut.-Colonel and Brevet Colonel C. R. Macgregor, C.B., D.S.O., I.S.C., to be a Colonel on the Staff in India, and to have the substantive rank of Colonel in the Army. Major and Brevet Lieut.-Colonel A. R. Martin, I.S.C., to be a Deputy Adjutant-General in India, and to have the substantive rank of Colonel in the Army. Colonel Sir Richard Westmacott, K.C.B., D.S.O., to be Major-General. Surgeon-General C. Colvin-Smith, M.D., C.B., to be Honorary Surgeon to the Queen. The following Lieut.-Colonels to be Colonels:—V. A. Schlach, I.S.C.; F. F. F. Roupell, h.p.; L. J. A. Chapman, R.A.; Harold Paget, C.B., h.p.; Hon. J. S. Napier, Inspector of Gymnasias, Aldershot; L. G. Brooke, Connaught Rangers; R. A. Hickson, the Buffs; T. C. Porter, 6th Dragoon Guards; J. H. E. Hinde, Border Regiment; C. F. A. Turnbull, Duke of Cornwall's Light Infantry; H. Boughey, York and Lancaster Regiment; St. G. C. Gore, R.E.; E. P. Wilford, Gloucester Regiment; G. B. Austin, I.S.C.; Malcolm Graham, A.S.C.; J. H. Spurgin, h.p.; C. W. Muir, C.I.E., I.S.C. Colonel T. O'Farrell, M.D., R.A.M.C., to be Surgeon-General. Lieut.-General Sir A. P. Palmer, K.C.B., to be General. Major-General C. R. Pennington, C.B., to be Lieut.-General. Colonel J. Waterhouse to be Major-General. Supernumerary Major-General Sir Bindon Blood, K.C.B., to be Major-General. Brevet Colonel H. O. Selby from Lieut.-Colonel, R.E., to have substantive rank of Colonel in the Army. Brevet Colonel F. T. N. Spratt Bowring from Lieut.-Colonel, R.E., to have substantive rank of Colonel in the Army. Brevet Colonel T. H. Brock from Lieut.-Colonel h.p. to be Colonel to command the 50th Regimental District. Colonel E. R. P. Woodgate, C.B., C.M.G., from h.p. to be Colonel to command the 17th Regimental District. Major-General M. H. Nicholson, C.B., Bombay Infantry, to be Lieut.-General. Colonel C. F. Thomas, Bengal Infantry, to be Major-General. Major-General and Hon. Lieut.-General G. B. Milman, C.B., Major of the Tower of London, to be Colonel of the Northumberland Fusiliers. Colonel (temporary Major-General) H. Hallam Parr, C.B., C.M.G., commanding troops Shorncliffe, to be Major-General.

HOME.—A Parliamentary return has been issued of the rifle ranges which have been closed to the firing of full charge ammunition since the issue of the Lee-Metford rifle, and of ranges approved during the same period. The total number of ranges closed was 572, 535 in Great Britain, 18 in Ireland, and 19 abroad. New ranges constructed or approved amount to 208, of which 186 will be in Great Britain, 10 in Ireland, 1 in the Channel Islands, and 11 abroad. Of those in Great Britain under the direct control of the War Department 13 have already been

constructed, and 6 are either in course of construction or are contemplated. For Yeomanry and Volunteers 167 new ranges are to be provided, as compared with 499 which have been closed—323 as unsafe and 176 for other reasons.

The Secretary of State for War has decided that in future the Royal Malta Artillery shall be available for general service. Hitherto the corps has not been liable to be employed outside Malta. All the officers will be required to accept the new conditions. Whilst doing duty outside Malta they will be entitled to armament pay, on the same conditions as those of the Royal Garrison Artillery. The non-commissioned officers and men will not be liable to foreign service unless they voluntarily accept such liability. Those who accept the new terms will be entitled to draw whilst employed at Malta an extra penny a day, and when actually serving out of the colony they will, as a general rule, receive the same pay as the infantry of the Line. They will also be granted an addition to their pensions.

One of the most interesting events of the past month was a demonstration of firing with Colt automatic guns, at Runnymede, on the 20th July. H.R.H. the Duke of Cambridge and a large number of distinguished officers were invited to be present on the occasion. Three guns were employed, and made excellent practice, being fired respectively by the experts, but it is said that the duties of firer can be undertaken by an untrained man, and this is put forward as one of the advantages of the gun. Firing commenced at a range of 1,200 yards, advancing up to one of 500, and it is quite certain that the rapidity and accuracy of the fire, as well as the facility with anything approaching a hitch was overcome, impressed the spectators most favourably.

The JOURNAL for April, 1896, contained a description and illustrations of the gun, but it had never been exhibited in this country until last month, and as it worked wonders in the Spanish-American war, both afloat and ashore, a few additional words may be desirable. The automatic operation of the gun is due to the explosion of the charge and not to recoil. There is a minute vent slightly in rear of the muzzle, in the lower side of the barrel, through which the powder gas acts on a piston, and works the mechanism which performs all that is necessary to feed, load, make ready, and fire the gun. It has been properly described as "a machine gun which is self-operating after one shot has been fired by hand, and as long as ammunition is supplied."

The barrel, which is of great strength, is an alloy of a nickel-steel character, and the other parts are marked by simplicity and solidity. They can be rapidly taken asunder or put together, with no other aid than that of two small screw-drivers. With regard to the kind of ammunition employed, the makers say that they can adapt it to any rifle projectile; and as to transport, a horse can carry it in a boot, or it can be fitted to a suitable gun-carriage and moved at the pace of cavalry. The rate of fire is about 400 rounds per minute.



TABLE OF MODERN MILITARY RIFLES AND CARBINES.  
Compiled in the Intelligence Division, War Office.

Rifles.

Country.	Designation.	Single Loader or Maga- zine.	Weight (about).	Calibre.	Sighted to	System.	Fixed.	Has Magazine a cut-off?	Magazine.			Fillers.
									In Maga- zine.	Extra Round in Chamber.	Total.	
Austria	Mannlicher M., 1895	M.	lb. 8 0½	315	yds. 2,133	Mannlicher	Yes	No	5	0	5	Yes.
Belgium	Repetir-Sturten M., 1895†	M.	8 14	315	1,962	Mannlicher	Yes	No	5	0	5	Yes.
Bulgaria	Mausier, 1895	M.	8 13	315	2,187	Mausier	Yes	No	5	0	5	Yes.
China	Mannlicher	M.	8 0½	315	2,133	Mannlicher	Yes	No	5	0	5	Yes.
Denmark	Lee	M.	8 12	315	2,133	Lee	No	...	...	...	...	No.
Egypt	Krag-Jørgensen	M.	8 12	315	2,297	Lee	Yes	Yes	5	1	6	Yes.
	Martini-Henry	S.L.	8 12	450	1,450	...	...	...	...	...	...	...
	Lee-Metford, Mark I.*	M.	9 8	303	2,800	Lee	Semi	Yes	8	1	9	No.
England	Lee-Metford, Mark II.*	M.	9 4	303	2,800	Lee	Semi	Yes	10	1	11	No.
	Lee-Enfield, Mark I.	M.	9 4	303	2,800	Lee	Semi	Yes	10	1	11	No.
France	Lebel	M.	9 4	315	2,187	Tube	Yes	Yes	8	1	9	No.
Germany	Rifle/88...	M.	8 6	311	2,242	Mannlicher	Yes	No	5	0	5	Yes.
Greece	Gras	S.L.	9 4	433	1,300	...	...	...	...	...	...	...
Holland	Mannlicher	M.	9 6	255	2,297	Mannlicher	Yes	No	5	0	5	Yes.
Italy	Mannlicher-Carcano, 1891	M.	8 6	255	2,187	Mannlicher	Yes	...	6	0	6	Yes.
Japan	Murata	M.	9 1½	312	2,187	Tube	Yes	...	8	1	9	No.
Norway	Krag-Jørgensen	M.	9 5	255	2,400	Lee	Yes	Yes	5	1	6	Yes.
Portugal	Kropatschek	M.	10 0	315	2,400	Tube	Yes	Yes	9	1	10	No.
Roumania	Mannlicher, 1893	M.	8 8	255	2,187	Mannlicher	Yes	No	5	0	5	Yes.
Russia†	3 Line Rifle, 1891	M.	9 12	290	2,500	Mannlicher	Yes	No	5	0	5	Yes.
Servia	Koka-Mausier	S.L.	9 14½	395	1,968	...	...	...	...	...	...	...
Spain	Spanish-Mausier/93	M.	8 13	275	2,187	Mausier	Yes	...	5	0	5	Yes.
Sweden§	Mausier...	M.	8 8	255	2,400	Mausier	No	Yes	5	1	6	...
Switzerland	Schmidt-Rubin, 1889	M.	8 9	301	2,187	Schmidt	Yes	Yes	12	1	13	Yes.
	Small Mausier	M.	8 9	301	2,187	Mausier	Yes	Yes	12	1	13	Yes.
Turkey	Big Mausier	M.	8 12	374	1,962	Winchester	Yes	No	9	1	10	No.
	Martini-Henry	S.L.	8 12	450	1,450	...	...	...	...	...	...	No.
United States	Krag-Jørgensen, No. 5	S.L.	9 1	300	2,200	Lee	Yes	Yes	5	1	6	...

† Short rifle for technical troops.

‡ Including bayonet, which is always carried fixed by Infantry.

§ First Instalment to be delivered this year. Present rifle a converted Remington, S.L.

Carbines.

Country.	Designation.	Single Loader or Maga- zine.	Weight (about).	Calibre.	Sighted to	System.	Fixed.	Has Magazine a cut-off?	Magazine.			Filters.
									In Maga- zine.	Extra Round in Chamber.	Total.	
Austria	Mannlicher M., 1895	M.	lb. oz. 6 10½	·315	yds. 1,902	Mannlicher	Yes	No	5	0	5	Yes.
Belgium	Mausser, 1895	M.	7 8	·275	1,531	Mausser	Yes	No	5	0	5	Yes.
Bulgaria	Mannlicher	M.	...	·315	2,000	Mannlicher	Yes	No	5	0	5	...
Denmark	Remington	S.L.	6 14	·445	...	...	...	...	...	...	...	...
Egypt	Martini-Henry	S.L.	7 10½	·450	1,180	...	...	...	...	...	...	...
England	Martini-Henry	S.L.	7 10½	·450	1,180	...	...	...	...	...	...	...
	Martini-Metford†	S.L.	8 1½	·303	1,400	...	...	...	...	...	...	...
	Martini-Enfield†	S.L.	7 4½	·303	2,000	...	...	...	...	...	...	...
	Lee-Metford, Mark I.	M.	7 7	·303	2,000	Lee	Semi	Yes	6	1	7	No.
France	Lee-Enfield, Mark I.	M.	7 7	·303	2,000	Lee	Semi	Yes	6	1	7	No.
Germany	Berthier	M.	...	·315	...	Berthier	Yes	...	3	1	4	Yes.
Greece	Carbine 88	M.	6 13	·311	1,312	Mannlicher	Yes	No	5	0	5	Yes.
Holland	Gras	S.L.	7 11	·433	...	...	...	...	...	...	...	...
Italy	Mannlicher	M.	7 11	·255	2,297	Mannlicher	Yes	No	5	0	5	Yes.
Japan	Moschetto di Cavalleria, 1891	M.	6 14	·255	1,640	Italian	Yes	No	6	0	6	Yes.
Norway†	Murata	S.L.	...	...	...	...	...	...	...	...	...	...
Portugal	Remington	S.L.	...	·315	1,750	...	...	...	...	...	...	...
Roumania	Kropatschek	M.	8 13	·315	1,035	Kropatschek	Yes	Yes	7	1	8	No.
Russia (rifle)	Mannlicher, 1893	M.	7 2	·255	...	Mannlicher	Yes	No	5	0	5	Yes.
Servia...	3 Line Rifle, 1891	M.	8 4	·299	2,500	Mannlicher	Yes	No	5	0	5	Yes.
Spain...	Koka-Milanovich	M.	7 4	·395	...	Mausser	Yes	No	3	0	3	No.
Sweden	Spanish Mauser, 1895	M.	7 0	·275	1,531	Mausser	Yes	No	5	0	5	Yes.
Switzerland	Mausser	M.	7 6	·255	1,760	Mausser	...	Yes	5	1	6	...
Turkey	Mannlicher	M.	7 0	·395	1,312	Mannlicher	No	Yes	6	1	7	...
	Winchester	M.	...	·450	1,000	Winchester	Yes	Yes	10 or 14	1	10 or 15	No.
United States	Martini-Henry	S.L.	7 10½	·450	1,180	Mausser	...	No	...	...	...	...
	Mausser	M.	8 6	·354	...	Lee	Yes	Yes	5	0	5	...
	Krag-Jorgensen	M.	...	·300	2,000	...	Yes	Yes	5	1	6	Yes.

† Converted from Martini-Henry arms. There are several patterns, differing only in minor particulars. Only the Martini-Metford Cavalry Carbines, Marks I.\* and II.\* are sighted to 1,400 yards; Mark III. is sighted to 2,000 yards.  
‡ A new Carbine, same model as rifle, is about to be issued.

TRANSVAAL. — The following suggestions have been communicated by an officer, who has served in South Africa and knows the Transvaal well :—

In the event of troops being sent to the Transvaal, and signalling companies being required, which would surely be the case, as the Transvaal is one of the finest countries in the world for signalling, owing to the numerous easily accessible hills, and the favourable conditions of the atmosphere—would it not be a wise thing to give some thought as to whether the signallers for these companies should be drawn from home or India?

Everything will have to be done on the most perfect scale to allow as few defects as possible. Therefore, we may at once decide that these signallers should be taken from India. The signalling authorities at Aldershot will probably say, Why? But let them think and they will see that by force of circumstances signallers trained at home cannot compete with men trained in India.

The circumstances are :—

1. The conditions of the climate are most favourable to signalling in India, while they are the reverse at home.
2. The topographical features of India make it a typical country for signalling.
3. In India eighteen men per regiment of infantry are inspected annually in the test, and twenty-two men have to be trained and kept up as signallers. There is thus a far larger number to select from, as at home only eight men per regiment are examined.
4. Signallers in India have opportunities of long-distance signalling, and often signal 20 miles and even twice that distance. For long-distance message work (which would almost certainly be needed in South Africa) practice is required, and the atmospheric conditions at home make such practice an impossibility.
5. The Indian signallers have had much experience on active service in the late frontier wars, and have gained much practical knowledge by which they have greatly benefited.

These few comparisons all go to show that for the Transvaal (which from a signalling point of view is very similar to India) the majority, if not the whole of the signallers, employed should be from India.

Now, as to the composition of the signallers required. The majority would have to be cavalry, with the infantry to form large massed stations at the heads of columns, etc., whilst the cavalry or mounted signallers move on with the mounted arms and keep the headquarter staff continually *au fait* with their movements, and enable the staff to receive all reports of the day's reconnaissances by about 8 p.m., instead of their coming in by dribbles at all hours of the night by mounted orderlies. Many senior officers say that signalling is not accurate enough to depend on in this way, but this must be on account of the work they have seen being done by untrained signallers, or, if that is too strong, by insufficiently trained signallers.

Signallers would be almost sure to be made use of at the Transvaal, and if given a fair chance by using the best men and thoroughly equipping them with the best of working material, in the event as such an unfortunate occurrence as a war with the Transvaal, they will prove themselves far more useful than any but signallers themselves imagine, and it will be seen that instead of signalling being done away with by wireless telegraphy or some such appliance in warfare, these new inventions cannot show their full value unless supported by the most skilled signallers collecting for them the reports of the most advanced cavalry. The advanced cavalry are said to be the eyes and ears of an Army; the primary means of transmitting to the brain-centres are the signallers.

INDIA.—The Commander-in-Chief in India has published a list of the proposed manœuvres and cold weather drills for 1899-1900. For the most part the troops in the various commands will carry out their winter manœuvres in their own districts. But, while there is to be no exceptionally large camp of exercise, operations under field service conditions will be undertaken at some period by the majority of units distributed throughout the Peninsula and Burma. The distribution of the forces which are to carry out this proposed scheme shows that it has been drawn up with infinite care, especially in the case of the manœuvres arranged for the Punjab command. The extensive plans which have been made for the troops, both British and Native, to be exercised in the hills is the most valuable innovation in the scheme, and is proof that Sir William Lockhart and his advisers are determined to profit by the lessons of recent campaigns on the frontier. The largest undertaking that has been planned is the operations of a force drawn from the Meerut command against the troops of the Sirhind district. The opposing forces will concentrate at Meerut and Ambala respectively, and will manœuvre northwards until they eventually come into contact in the vicinity of Dehra Dun, a more or less hilly country. A force, consisting of thirty-six guns, seven squadrons of cavalry, and ten battalions of infantry, drawn from the garrisons of the Oudh and Allahabad districts, will concentrate for manœuvres in the vicinity of Mirzapur.

Hill manœuvres will take place at Ranikhet in connection with the reliefs of the British battalions arriving at and leaving that station. The Peshawar garrison, consisting of 12th Bengal Cavalry, 24th Field Battery, Royal Artillery, 1st Bn. Royal Scots Fusiliers, 1st Bn. Hampshire Regiment, 24th and 27th Punjab Infantry, and No. 1 Company Bengal Sappers and Miners, will march to Attock for manœuvres, and then, with the addition of the 1st Bn. Dorsetshire Regiment, will proceed to the Abbottabad Valley to be exercised in the hills with the Gurkha battalions in garrison there. In order that the Peshawar garrison district may not be denuded of troops while its garrison is away, the Campbellpur and Rawal-Pindi garrisons will move into the Peshawar Valley and probably manœuvre in the Bara Plain. This general movement of troops on the Peshawar frontier, besides giving the men the necessary training, will doubtless exercise a good effect upon the tribesmen across the border. They will probably attach significance to the assembling of such a large force in the Peshawar Valley and doubtless the impression formed will produce a salutary effect. On the return of the Peshawar force from Abbottabad, the Rawal-Pindi contingent will return to its original cantonments with the exception of such units as are moving in relief to new stations or attending the standing camp of instruction at Campbellpur. The Mian Mir garrison will operate with the troops stationed at Dalhousie and will be joined by battalions from Jullunder, Sialkot, Dharmasala, and Bakloh. An element of hill training will be introduced into the operations of this force. To the Calcutta garrison is allotted a different course of training, as they are to be exercised in the duties attaching to the river defences of the Hugli. The Secunderabad and Bangalore garrisons will operate against each other on suitable ground equidistant from either station. The troops in station at Ferozpur and Multan will likewise manœuvre together on locally selected ground. The troops of the Quetta command will concentrate in the vicinity of Quetta, and the garrisons of Neemuch, Nassirabad, and Mhow move out for their manœuvres to the neighbourhood of Neemuch. Three batteries of field artillery, a regiment of native cavalry, two British and one native infantry battalion from the Poonah garrison will march under field service conditions to Khandala and there manœuvre. From smaller commands, such as Ahmadnagar, Sirur, Kampti, Jabalpur, and Sind, the garrisons all march into the country, and in such cases as are practicable troops from two adjacent commands will be brought into contact. The majority of units taking part in this scheme of winter manœuvres are due to change stations under the relief programme, and the manœuvres have been so arranged as to be under-



taken *en route* to the new stations. All movements will be made under field service conditions, and it is the intention of the Commander-in-Chief that British troops shall remain under canvas for as long a period as possible. It is understood that as a general rule the troops will remain under the command of the general officers commanding the districts to which they belong, and that no special manœuvre appointments will be made.—*Times*.

AUSTRIA-HUNGARY.—There is now a question of re-introducing the lance into the Austrian Army, an arm that they were one of the first to give up. At present it is only contemplated giving it to the Uhlans, and that only as a tentative measure. It is, apparently, the example of Germany, which has made the use of the lance so general that has induced Austria to give that weapon a further trial. In Austria the question is not merely a technical one. It has also its political side, in the sense that the opponents to the lance are altogether amongst Hungarians, whose favourite weapon has always been the sabre, just as the lance has always been that of the Poles and Slavs. The lance was first suppressed in the Landwehr on account of the shorter time that it was serviceable, then the measure was extended to the Uhlans of the Regular Service, on account of the difficulty of giving proper instruction in its use, reasons which those in its favour are by way of refuting by pointing to its use in other Armies.—*Le Progrès Militaire*.

FRANCE.—The Minister of War has published an account of the recruiting operations of the year 1898. This document is divided into two parts—the first part gives the results of the law of the 15th July, 1889, in France and Algiers; the second is composed of official documents and statistical tables referred to in the first part.

The drawing of lots commenced on the 16th January, 1898, and ended on the 10th February of the same year; the meetings of the Revision Boards commenced on the 21st February and terminated on the 20th June following. Amongst the young men liable to form part of the 1897 class there were 5,748 sons of foreigners, 288 having claimed and established their rights as foreigners were struck out of the census tables; the 5,460 others were subject to the decision of the Revision Board, which decided that 3,818 were liable for service. The number of those omitted from the previous classes, and whose omission was discovered since the formation of the 1896 class, amounted to 1,639. The number of those admitted to the participation in the drawing of lots, after the rectification of the census tables, amounted to 331,179—a diminution of 7,148 on the numbers of the preceding class. All these young men were cited individually before the Revision Board, but 8,521 neither presented themselves nor were represented. In consequence of the medical inspection 26,198 were rejected as unfit for service, and the number of those inscribed on the recruiting lists is thus reduced to 304,981, less by 5,835 than those of the preceding class. The distribution of these recruits amongst the seven parts of the recruiting list is as follows:—

1st part—Fit for service (3 years) ... ..	152,944
2nd „ Exempt, Article 21 ... ..	51,247
3rd „ Exempt, Articles 23 and 50 ... ..	4,449
4th „ Already connected with the Service ... ..	30,018
5th „ Postponed ... ..	45,276
6th „ Classified in the Auxiliary Services ... ..	20,929
7th „ Debarred from service ... ..	118

Total 304,981

47,036 postponed men of the 1896 class, who passed the medical examination for the second time, were also examined in 1898; as well as 22,685 postponed men of the 1895 class, who underwent the same examination for the third and last time. These, as well as the postponed men of the 1897 class, were distributed amongst the seven parts of the recruiting list.

The Board of Revision passed 7,513 young men of the 1897 class and 569 postponed men of the 1896 class, as sole supporters of families. They also exempted from military service in peace-time 746 young men, who, before reaching the age of nineteen, had taken up their abode in a foreign country outside Europe, and were in regular business there. After these operations the number of young men liable to be called out for service with the colours amounted to 230,783; but 384 of these asked to be posted to colonial troops, and, having been found fit for that service, the contingent available for the Territorial Army was in reality 230,399 men.

This contingent was distributed amongst the different arms in the following proportions : —

	Called out for	
	1 year.	2 and 3 years.
Infantry ... ..	63,151	103,030
Cavalry ... ..	—	20,912
Artillery ... ..	8,647	20,390
Engineers ... ..	1,218	3,876
Military Train ... ..	1,218	2,040
Administration Troops ... ..	2,041	3,876
Totals ... ..	76,275	154,124

That is to say, a total of 230,399 men who joined their respective corps between the 14th and 16th November, 1898.

In the course of the year 1898 the military authorities bestowed 402 No. 1 discharges for illness resulting from service, 13,802 No. 2 discharges, and 3,564 temporary discharges. 234,680 men were released from active service; 155,328 being placed in the reserve, and 79,352 were classified as unemployed.

The following was the position of the 331,179 men of the 1897 class from an educational point of view :—

Neither read nor write ... ..	16,154
Those who could only read... ..	4,477
Both read and write ... ..	38,206
Having a better primary education ... ..	249,302
In possession of certificates of primary education ... ..	4,563
In possession of University degree ... ..	6,677
Nothing known about the education of ... ..	11,800
Total ... ..	331,179

The average height the young men on the lists was about 5 feet 4 inches.

The number of voluntary engagements of 3, 4, and 5 years entered into in 1898 for French corps, foreign regiments, and native Algerian corps, amounted to 29,795, of which 8,378 were for the Navy and Colonial troops, 17,225 for the Home Army, and 4,192 for regiments quartered in Algiers and Tunis. This does not include special enlistments from the polytechnic schools, manufactories, etc.

In 1898, 6,254 re-engagements of from 1 to 5 years were entered into by non-commissioned officers of the Home Army (20 less than in 1897), and 630 by corporals, lance-corporals, and men.

With regard to Algiers, the 1897 census contained the names of 5,280 young men; 369 having been exempted as unfit for service, there remained 4,911, to whom must be added 327 postponed from the 1895 and 1896 classes. The contingent available after the medical inspection consisted of 3,292 men, who were

distributed as follows :—To infantry, 1,944 ; to cavalry, 175 ; to artillery, 600 ; to engineers, 100 ; to military train, 135 ; to administration troops, 288.—*Revue du Cercle Militaire and Progrès Militaire.*

The 1st Cuirassier Brigade (the 5th and 8th Regiments) will not take part in the grand manœuvres of the 5th and 9th Army Corps. A squadron of the 5th Cuirassiers will be detached to Tours to assist the Marine Infantry which will manœuvre in the neighbourhood of Bléré. By order of General Giovanninelli, the director of the grand manœuvres, the concentration of the 9th Army Corps is fixed from the 4th to the 7th September.

The Grand Presidential Review will take place on Sunday, 17th September, instead of on Thursday, the 14th, as was originally fixed ; it will be upon the plateau of Tauxigny, near Cormery, in the district of Loches.

The 5th Army Corps will concentrate at Bléré on the 7th September, and the manœuvres of that army corps will take place from the 9th to the 16th September, between La Haye-Descartes and Loches, in the neighbourhood of Ligueil.—*Le Progrès Militaire.*

GERMANY.—In the beginning of last March, the railway troops constructed across woodwork a piece of a line of railway, with normal gauge, to unite with the military railway at the station of Jäniekendorf. According to the scheme adopted a deep hollow had to be crossed by means of a temporary bridge. It was a question of constructing as quickly as possible both the rails and the bridge. The operation was completed in a wonderfully short time. A hundred trees were cut down on the spot itself, a field forge was established in the neighbourhood, and the work was continued day and night. In eleven days everything was finished. The bridge was 150 metres long, and overhung the valley, which was a dozen metres deep ; it was supported by trestles 4 metres wide. It underwent trials of its resisting powers with the most satisfactory results, a train drawn by two engines passing over it. It was built by two companies of the 1st Railway Regiment.—*Revue Militaire.*

A recent Cabinet Order of the 16th June, 1899, places the field artillery in all service matters under the orders of the generals commanding divisions and army corps, who are responsible for the war preparation of this arm, as well as for that of the infantry and cavalry. These officers should, on their annual garrison tours, inspect the field artillery units at their battle manœuvres and their range practices as well as at their regimental drills.

The Inspector-General of Field Artillery directs the development of shooting instruction, according to the regulations in force, and as chief of the Field Artillery School of Gunnery he superintends this instruction and sees that it is carried out in conformity with the spirit of the regulations. He proposes any modifications that may seem right to him to the Minister of War. He also assists each year at the practice camps of as many regiments of field artillery as possible, the dates of these practice camps being settled by commanders of army corps. He takes part in the Autumn Imperial Grand Manœuvres, and can, if he wishes, take part in the manœuvres of other army corps.—*Militär-Wochenblatt.*

Stringent orders have been issued on the subject of the organisation of convoys during the manœuvres. The limitations of the law on supplies must be strictly adhered to with regard to the number of freight wagons and the extent of their loads. The bringing of special tents to the manœuvres is also forbidden, as well as all excess of baggage. Besides the valise, whose dimensions are laid down by regulation, officers may not take even a light portmanteau with them. Sergeant-majors and quartermasters are forbidden to put a greater weight on the wagons than that laid down for war-time, one-year volunteers are not allowed

to put anything on the wagons. The carriage of field blankets, sleeping sacks, tables, chairs, etc., is forbidden. The drink supplies must be cut down to an irreducible minimum. It is forbidden to allow men, in excess of the effective, such as orderlies and bandsmen, to ride on the wagons. Superior officers are requested to exercise the strictest personal supervision regarding these orders.—*Revue du Cercle Militaire.*

According to the *Allgemeine Militär-Zeitung*, a most interesting night experiment took place a few days ago with the object of experimenting with the acetylene search-light, invented by Lieutenant von Kries, of the Guard Military Train Battalion, in searching for the wounded. This trial, directed by Surgeon-Major Zelle, was carried out on the manœuvring ground of the railway brigade behind Schöneberg. The special idea was as follows:—A detachment of the Medical Staff has been ordered to search a very intersected piece of ground during the night and to carry the wounded to the tent for dressing their wounds, where some very difficult surgical operations have to be undertaken.

A detachment of the guard military train, and some men of the railway brigade took part in the exercise, in all 182 men. Whilst a portion of the detachment acted as wounded men, 5 sections with 18 stretchers and 3 search-lights were employed in searching for them. The search-light, which is carried and managed by one man alone, gave good results; it lighted up the ground clearly for 80 to 100 metres. The *Allgemeine Militär-Zeitung* adds that the acetylene search-light may also be advantageously used in other military operations, such as the construction of a bridge by night. Lieutenant von Kries has also invented an acetylene lamp of 60 candle-power to light up the operating tent, which may very advantageously supersede the petroleum lamps now used. The light the acetylene lamp gives will allow military doctors to undertake surgical operations as efficiently as by daylight.

In Alsace-Lorraine the number of young men cited to appear before the Revision Board in 1898 amounted to 42,827, including 18,744 of the 1898 class, the remainder belonged to previous classes and had been postponed for various reasons.

The recruiting statistics give the following results:—16,280 young men were postponed to 1899; 11 were exempted; 1,021 discharged; 1,871 posted to the 1st Levy of the Landsturm; 3,304 to the reserve; 7,416 were drafted to regiments. The number of conscripts who failed to appear amounted to 1,711. Again on this occasion the Alsace-Lorraine contingent did not fulfil its conditions of  $\frac{1}{3}$  per cent. of the total population. As this consists of 1,641,000 inhabitants, the number of the men drafted to regiments should be 8,205, whereas it actually amounted to only 7,416 men.—*La France Militaire.*

Some most interesting pioneer manœuvres took place on the Müggelsee, about 12½ miles to the south-west of Berlin, on the night of the 17th and 18th July last. The following details are taken from the *Berliner Tageblatt* of the 18th July. It was required to find out the length of time necessary for the transport of a large body of men across a fairly large sheet of water over which it was not possible to build a bridge of boats.

The 3rd Battalion of the 3rd Grenadier Guard Regiment which left their quarters on the morning of the 17th July and who had thrown out advanced posts along the left bank of the Müggelsee, were attacked. The hostile army was represented by the Emperor Alexander's Grenadier Guard Regiment, the battalion of the Pioneer Guards, and the 3rd Battalion of Pioneers. These troops arrived at about 11.30 at night at the place of rendezvous, behind Bad-Bellevue. 138 pontoons were placed almost noiselessly in the water and attached two and two together by means of ribands so as to form 68 double pontoons. Each company of the assaulting infantry was embarked on four double pontoons and these transports



were propelled by the pioneers, without noise, by means of oars muffled with flannel. According to the scheme the landing would be considered as successfully effected if the pontoons were able to approach within 100 yards of the enemy without being perceived.

The disembarkation commenced at about 2 a.m. ; but before that some of the pontoons had been scattered along different points on the left bank so as to mask the spot where the real landing of the main body of the assailants would take place.

The manœuvre was crowned with success, and at 2.15 a.m. the first volleys of the defenders were heard. The whole of the Emperor Alexander's Grenadier Guard Regiment was transported from one bank to the other, a distance of about 2 miles, in forty-five minutes. The defenders fell back on Müggelbergen, were driven from the position they had taken up there, and retreated on Koenick after their rear guard had sustained some heavy fighting with the main body of the assailants. The manœuvres ended at about 4 a.m.

ITALY.—Since the 1st July of the current year the Italian effective strength in Africa is as follows :—

Troops.	Italian Officers and Soldiers.	Native Officers and Soldiers.	Animals.
Staff ... ..	33	5	5
1 Company of Carabineers .. ..	69	158	108
3 Companies of Chasseurs ... ..	511	—	3
6 Native Battalions ... ..	150	3,708	342
1 Native Squadron ... ..	3	126	133
Military Artificers ... ..	104	2	5
1 Company of Artillery ... ..	39	398	16
2 Native Batteries ... ..	24	358	326
Army Service Corps ... ..	34	275	370
1 Company of Engineers ... ..	167	138	36
Medical Corps ... ..	72	26	2
Veterinary Corps ... ..	6	3	3
Administration Corps ... ..	66	—	—
1 Coast Company ... ..	6	353	12
Military Court of Justice ... ..	6	1	—
Total ... ..	1,292 <sup>1</sup>	5,551	1,365

<sup>1</sup>Of which 186 are officers.

Thus there are altogether 6,843 officers and men and 1,365 animals. There is, besides, at Naples a special dépôt for African troops. This dépôt consists of 5 officers and 30 men.

The Special Siege Manœuvres will take place at Susa, from the 1st to the 23rd August. The defensive force will consist of :—2 infantry and 1 Alpine battalions, 1 troop of cavalry, 3 companies of garrison artillery, 1 company of miners, 1 telegraph section, 1 section of military artificers, 1 heavy photo-electric park. The attacking force will consist of :—4 infantry and 2 Alpine battalions, 1 troop of cavalry, 3 batteries of field artillery, 1 brigade of mountain artillery, 2 sections of military artificers, 3 companies of sappers, 1 telegraph company, 1 company of miners, 1 artillery siege-park,  $\frac{1}{2}$  engineer park,  $\frac{1}{2}$  telegraph park,  $\frac{1}{2}$  miner park,  $\frac{1}{2}$  photographic section, 1 light photo-electric park, 1 mountain engineers' siege-park. These manœuvres should be most curious and exceedingly interesting to follow.

The War Minister has modified the allowance tariff to which troops quartered in the higher mountain ranges are entitled.

In future these troops will receive a special allowance, called "detachment allowance," which is 1 lira 60 centessimi for lieutenants and sub-lieutenants, 1 lira 80 centessimi for captains, 2 lire 20 centessimi for majors and lieutenant-colonels.

During the reconnaissance period the Alpine troops will receive a "marching allowance": lieutenants 2 lire, captains 2 lire 50, majors and lieutenant-colonels 3 lire 50, colonels 5 lire. Officers detached for service reasons will receive "transport allowance" No. 2, if they have not to sleep out: lieutenants 2 lire 50, captains 3 lire, majors and lieutenant-colonels 3 lire 50, colonels 5 lire. If they have to sleep out they receive "transport allowance" No. 1: lieutenants 5 lire, captains 6 lire, majors and lieutenant-colonels 7 lire, colonels 10 lire.

The rank and file travelling independently receive a daily allowance of 50 centessimi in addition to their pay.

In the Alpine shelters officers and men are entitled to beds with linen.

During the whole of the time that they pass in the higher mountain ranges, non-commissioned officers receive a "marching allowance" of 30 centessimi, corporals and soldiers one of 15.

A ministerial decision determines the zones and districts where these allowances to the Alpine troops are due.—*Le Progrès Militaire*.

In 1898 the military authorities bought 4,638 horses (of which 767 were fit for service, and 3,871 were colts), as remounts for the cavalry, artillery, and engineers.

The horses fit for service, viz., 5 years old and upwards, were immediately distributed by the Buying Commission as follows:—26 to the cavalry school at Pignerol, 150 to cavalry regiments, 521 to artillery regiments, and 70 to engineer regiments. The remount contingents of these corps or establishment were completed by drafts of colts, bought at from 2 to 4 years of age, and kept for two years at schooling depôts before being drafted to regiments. The average numbers of these annual contingents amount to about 4,500 horses. The colts purchased in 1898 were distributed amongst the schooling depôts. Their situation on the 1st January, 1899, was as follows:—At Grosseto, 2,024 colts; at Bonorva, 717; at Persano, 673; at Paterno, 368; at Portovecchio, 295; at Palmanova, 275. Total, 4,352 young horses.—*Revue du Cercle Militaire*.

ROUMANIA.—The organisation of the territorial cavalry underwent some modifications during last year. One knows that the cavalry of this country consists of 6 regiments of permanent cavalry (Roshiori), which form, in time of war, an independent cavalry division, and 11 regiments of territorial cavalry (Calarassi). The former consists of 4 permanent squadrons; the latter have no fixed composition. Thus the 7th and 8th Regiments have 4 permanent squadrons each; the 9th (Drobroudja) Regiment has 2 permanent and 2 semi-permanent squadrons; the other 8 regiments have had, hitherto, 1 permanent and 3 semi-permanent squadrons. It has been determined, since last year, that the 1st, 3rd, and 4th Calarassi Regiments should consist of 2 permanent and 2 semi-permanent squadrons. Thus there are, as a matter of fact, in the 11 Calarassi regiments 21 permanent and 23 semi-permanent squadrons. This change marks a fresh step in the course followed by the Roumanian War Minister, who is trying by degrees to get rid of the semi-permanent units, which are not to be relied upon in several respects. The territorial cavalry, with the exception of the 9th Regiment, is divided into 4 cavalry brigades belonging to the corresponding army corps. The 1st Cavalry Brigade includes the 1st and 2nd Regiments; the 2nd Brigade, the 3rd, 4th, and 10th Regiments; the 3rd Brigade, the 5th, 6th, and 11th Regiments; and the 4th Brigade, the 7th and 8th Regiments. The organisation is evidently not uniform, and is therefore, probably, incomplete.

The future re-organisation of the Roumanian cavalry will, no doubt, carry with it the transformation of the 1st, 3rd, 4th, and one other regiment into regiments of 4 permanent squadrons. Thus with the 7th and 8th Regiments there will be 6 permanent Calarassi regiments which will become Roshiori regiments, and will allow of the formation of a second cavalry division. The 4 other Calarassi regiments will form corps cavalry. The 9th Regiment will remain with the Drobrudja division. Last year 2 squadrons of staff orderlies were also formed.

The actual strength of the Roumanian Army on a war-footing consists of:—

Active Army—111 battalions, 68 squadrons, 68 field and 7 horse artillery batteries, 24 companies of engineers, making a total of about 195,000 men. 35 fourth battalions—40,000 men.

Depôts—5,700 men, and finally 70 Militia battalions, about 75,000 men.

The effective total of the Roumanians on a war-footing would therefore be 315,000 men, not including the flotilla. This latter has also been increased, and 2 river monitors, and 3 torpedo-boats have been ordered for the defence of the Lower Danube.

The Budget, which amounted to an extraordinary credit, is thus divided:—

	Francs.
Clothing and food of reservists ... ..	2,000,000
Medical service in war-time ... ..	500,000
2 monitors, 3 torpedo-boats and torpedoes ... ..	4,000,000
Armament of forts at Bucharest ... ..	1,450,000
Building of barracks ... ..	7,750,000
Cavalry and artillery remounts ... ..	300,000
Small arms and rifles ... ..	4,000,000

The ordinary Budget for 1898-1899 amounts to 45,380,325 francs.—*La France Militaire*.

RUSSIA.—The *Neue Militärische Blätter* gives the following details of the new Russian infantry regulation. "The Russo-Turkish War of 1877-1878 clearly showed that the formations and principles of the Russian battle formation were antiquated, and it therefore induced the elaboration of a new regulation for infantry drill, published in 1881. But whether the experiences gained in this war did not permit of a clear recognition of the *sense* of the necessary modifications—looking at the various phases presented by the theatre of war and of opposing tactics—or whether divergencies of opinion were not sufficiently allowed for in the Russian Army (which at that time did not trouble itself much about military science), the fact remains that the drill regulations of 1881 presented a mechanical appearance in a most marked degree, and did not take advantage of improvements in the way that had been hoped. The result was that in 1890 the elaboration of a new infantry regulation, which would benefit by the great advance of science, and by the comprehension of the modern tactical requirements of the Russian Army during the preceding 10 years, had to be thought out afresh. Thus the plan of the new regulation appeared in 1897; it was tried at the grand manœuvres of last year, and should be definitely adopted after the reports, which should be handed in by October, 1899, have pronounced on certain improvements which it may be necessary to add to it. The scheme in question allows one, however, to examine the characteristic side of the new regulation.

"There is little to be said about the elementary part, the division of the Russian company into four sections shows a divergence from the German methods. Special note should however be made on the importance given to lessening the effect of the enemy's fire, by laying down the rule that companies destined for the first line should be entirely deployed as skirmishers, that the entry of the reserve companies into the firing line should be made in echelons of ranks, or by column of sections on the flank, that is to say, by formations which, according to the experience gained in musketry schools, are exposed to the minimum of losses from the

enemy's fire. On the other hand, in singular contrast, there is a rule which pays no regard to the present effects of infantry fire; it lays down that the companies composing a reserve battalion should never be separated. This compact formation would evidently suffer severely under the fire of the modern rifle. The extent of front allotted to a battalion is, as in Germany, 400 metres, and it should from the commencement be occupied entirely by the companies in the firing line. This precept renders, as a rule, the reinforcement of the line of skirmishers only possible by the insertion of the reserve companies; thus the mixing up of companies in prolonging the line becomes the rule, a thing that the Germans try to avoid as much as possible, if they cannot altogether do so. The mode of attack is partly according to individual initiative, as in Germany, and partly in accordance with the "normal attack procedure," so much praised up by certain text-books. The rules laid down for the different units are openly based on a made-up picture of a planned battle, and it is this picture which was constantly reproduced in a most striking manner at the last manoeuvres, when the troops were acting on the new regulations. In this, too, there was a certain methodical trait whose faults could only be eradicated if latitude not to follow the letter of the regulation under certain circumstances was given by those in authority to the commanders interested, and if the commanders have sufficient initiative to model their tactical procedure on the situation of the fight. The deployment of the infantry preceding the attack takes place at 2 or 2½ versts (a verst being about 1,067 metres) from the enemy if he has no artillery, otherwise it takes place at a distance of 4 versts. The skirmishers continue to advance continuously and quietly, only firing on particularly favourable objects up to 1,400 to 1,000 paces from the enemy; from that distance to within 400 or 500 paces from the enemy—a distance at which decisive fire should develop—the advance is made as far as possible, at a walk, either of the whole line or by echelons.

"According to German ideas these principles could hardly be admitted, because they partake too much of routine and do not make sufficient allowances for topographical conditions, besides the distance laid down for the commencement of decisive fire gives a false idea of the present effect of real fire. It is true that in order to give proper effect to one's own fire in preparing for the assault, it is advantageous to get as close as possible to the enemy for the delivery of decisive fire; but as far as peace experiences allow one to judge, it is impossible for skirmishers to approach, especially at a walk, to within 400 or 500 paces of an adversary, who occupies a tolerably advantageous position, and who can take aim at leisure. The generally received opinion, according to which the fire preceding the assault should be delivered from 500 to 700 paces of the enemy (unless some unusual conditions permit of a closer approach), appears to be more in conformity with the reality. The object of a regulation should not, moreover, be to place the fighting conditions in peace-time in a more favourable light than they would actually appear in war, otherwise it must lead to incalculable discouragements and difficulties on active service.

"From this sketch of the general ideas contained in the new Russian infantry regulation it would undoubtedly appear that it has not been able to get rid of a certain spirit of routine, and that it is wanting in a proper appreciation of the effect of an enemy's fire. On the other hand, it cannot be denied that from a tactical point of view it contains many apposite maxims, and that, compared with the old regulation, it shows a progress that will certainly be of great advantage to the Russian Army."

The following is an explanation of the projected military reforms in Finland, given by the *Rouski Invalid* :—

"A rescript of the Emperor Alexander II., dated 31st December, 1870, desired the Governor-General of Finland to study the subject of compulsory service, as proposed for the rest of the Empire, with special regard to the Grand Duchy.



The Commission charged, by virtue of this order, to formulate a law on military service in Finland, had to be prorogued until the promulgation of a definite law for the rest of the Empire. The project elaborated by the Commission was submitted to the Senate and to the Diet. The latter however started from the principle that if military service is compulsory for all, Finnish troops should only be employed in the defence of their own territory.

"The chief provisions admitted by the Finnish Diet were the following:—

"1. The armed forces of the country, composed exclusively of Finnish citizens, should include Regular troops, a Reserve, and a Militia."

"2. The length of active service is three years, the men then immediately pass two years in the Reserve. Those who do not go through the active service, put in five years in the Reserve, and during the first three years are liable to be called out to camps of instruction for a period of nine days. On leaving the Reserve all are passed into the Militia, where they remain until 40 years of age.

"3. The Finnish troops are composed of nine battalions of chasseurs and a regiment of dragoons, which are under the orders of the Governor-General; they have their own commander and a special staff. At the Ministry of War a Finnish reporter is charged with all matters relating to the Finnish troops. Administrative and legislative matters are presented to the Emperor by the Secretarial Minister for the Duchy of Finland.

"These regulations thus instituted an independent Army which had but few points in common with the Army of the State, of which the Grand Duchy was a part. Nothing had been since done to abolish this isolation. A provision of 1876 allowing the posting of Russian officers to Finnish regiments remained without any practical effect, and the Diet requested in 1878 that the paragraph laying down that the Finnish troops should be composed exclusively of Finnish citizens should be inscribed in the fundamental laws of the country. Ten years of existence of this Finnish law brought to light objections to this distinction between two Armies of the same Empire, and a Commission was charged with the revision of this military law. The Commission proved that whereas the Finlanders only gave 6 per cent. of men to the service of the State, Russia gave 36 per cent. Also from a budget point of view, the Empire expended 28 per cent. for territorial defence, whilst Finland only contributed 16 per cent. of its expenditure for that object, and from 1862 to 1870 the latter only contributed from 6 to 7 per cent.

"The Commission therefore thought it right that Finland should submit to the same proportion of military charges as the rest of Russia, allowing a lapse of 10 years to arrive at that result. The recruit contingent was gradually raised, and further the recruits were not posted exclusively to Finnish regiments, but might also serve in the neighbouring districts. Finland thus furnished each year for 10 years 7,200 recruits, of whom 5,280 were posted to Russian regiments.

"With regard to military expenditure, the Commission considered that the most equitable procedure would be to distribute it in proportion to the population. Finally, the Commission judged it expedient to place Finland on the same footing as the rest of Russia for general military obligations. These conclusions of the Commission were approved by the Emperor and submitted to the examination of the Diet. There is no doubt a certain restriction of the privileges of Finland, but is it just, on the other hand, that the Russian people should be more heavily taxed for the defence of the country than Finland, which is an integral portion of it? It is easily understood that Finland is desirous of retaining a privileged position, but when military taxes are so heavy for the whole country it seems perfectly natural that Russia should wish to divide them uniformly amongst all her subjects."

The order to the troops of the Finland district frontier summer manœuvres at Vilmanstrand gives the following instructions:—

*Infantry.*—As the regulation relative to the battle action of infantry leaves a great deal to individual initiative with regard to the application of

manceuvre and battle formations, constant drills become necessary in order to practise them, and form one of the chief objects of the summer assemblies. It is not on the drill ground, but in broken country, that the proper spirit and the art are developed by which to solve in the best way, according to given circumstances, the question of the best formations to be adopted.

When in loose order a continual look-out should be kept for its proper application to the features of the ground and to fire discipline. Firing without adjusting the back-sight should never be permitted. Troops should accustom themselves to obtaining cover quickly by means of entrenchments, without however forgetting that a badly masked entrenchment is more harmful than useful. The attack and defence of the entrenchments should be frequently practised, night and wood fighting, also battle and reserve formations in an intersected country. The particular features of Finland oblige one, at almost every step, to manœuvre and fight in defiles formed by woods, marshes, rocks, and lakes. In this country the strength of a defensive position lies in its front, and the assailants find special difficulties for frontal attacks. It is obvious that the attack must endeavour to attain its object by a turning movement, the defence should therefore guard its flanks and dexterously oppose the enemy's manœuvres. Particular features of field service, such as escort for convoys, the attack and defence of railroads, guerilla warfare, etc., acquire an altogether special importance in Finland. In studying the new reconnaissance regulations, particular regard must be paid to local circumstances.

Reconnaissance duty, on account of the insufficiency of cavalry, and the difficulty attending the employment of that arm in this country, must in a great measure be entrusted to the infantry, and requires from them the very greatest attention. Cyclists and field telephones may in this case be of very great service, by adapting their use to the nature of the ground. Rifle scouts may be of the very first importance in the Finland country, and they should receive particularly careful instruction. It should not, however, be forgotten that they must never be used in battle as a tactical unit.

The marches, too, must be influenced by the nature of the country; the best distribution of the different arms on the column of march, the best method of protecting them, and the most advantageous manner of changing from column of route to battle formation, should consequently be frequently practised experimentally.

*Cavalry.*—The Finland regiment of dragoons will take part in the manœuvres of Krasnoé-Sélo, where they should arrive about the beginning of July, thoroughly efficient in all cavalry duties. They must therefore be carefully and practically taught all the forms and procedures of guard and reconnaissance duties, as well as those of Cossack posts, according to the new field service regulations. Particular attention should be paid to patrol duties, to getting quickly over natural obstacles, to the preparation of obstacles for checking the enemy's advance, and to the crossing of rivers by swimming or by means of temporary bridges, etc.

*Artillery.*—Will be guided by the requirements of the Director-General of Ordnance, and will conform strictly to the rules laid down by the Artillery Committee, in such a way as to avoid the repetition of the same mistakes as occurred last year; it will always bear in mind the importance of taking precautions against accidents in firing, and will follow in every particular the rules laid down by the firing regulations. During the period of the general assemblies care should be taken:—1. To make the artillery known to the infantry, to manœuvre in close connection with the other arms, and to get accustomed to grasp the situation rapidly, and to conform to their movements:—2. In the rapid construction of epaulements and the best means of masking them, and to getting quickly over obstacles.

In the small manœuvres that combination of the various arms should never be lost sight of, which, if the objective is well defined, should form the best guarantee of success. The commanders should criticise the manœuvres in detail, explain the

action of the opposing sides, and make their own observations on them in special orders. Umpires should extend the sphere of their activity. It should be borne in mind that at instruction faults are natural, but they should be retrieved so as to turn them to the best possible account. To accustom troops to the conditions of war, at certain manœuvres the units should be placed on a war footing, do their cooking in their mess tins, and only use the baggage train that they would have in war-time; with the same object the men should only have their camp equipment at all the small manœuvres.

Commanders should try to develop their faculty for command, and should therefore study the peculiar qualities of the different troops, and specially of those not belonging to their own branch of the Service. He alone will quickly and surely grasp a situation, and make up his mind how to act with rapidity, who thoroughly knows his duties, and does not hesitate to give orders during manœuvres or during instruction. Time should not be lost in looking for the best solution, because that decision is alone good which is taken promptly. It should be borne in mind that a decision once taken should be put into instant execution by means of an energetic command, or by clear orders, short and precise. During instruction, and especially at manœuvres, everyone, as far as possible, down to the private soldier, should know the scheme, and also, in their general features, the measures adopted to attain the object in view.

The Grand Duke Vladimir will command in person at the camp at Krasnoé-Sélo, and has issued the following orders:—"The tactical instruction of the troops will be carried out in the strictest conformity with the existing regulations, and in accordance with the instructions given to the troops of the district during the last few years. The most difficult and complicated problem of war is, for infantry, their fire, which, after their *moral*, has become, with the improvement in the rifle, the first factor of victory; for cavalry it is the reconnaissance of the enemy. There is still a great deal for us to accomplish in these two branches of preparation for war. I, therefore, bring the shooting of the infantry and the cavalry reconnaissance to the special notice of commanders of every degree, and to that of officers of all ranks.

"With a view to obtaining the greatest possible progress in practical work, paying, at the same time, due regard to the strength and the health of the men, I direct that the following dispositions are observed, viz., the musketry course is to be gone through without hurry; the same exercises are to be repeated until they are well done. In field firing and in firing during manœuvres only long-range fire should be used against men under cover, and short-range fire, at first moderate, then rapid, against a chain of skirmishers in trenches (targets half the height of a man placed behind an embankment and only the half visible).

"During the second period in camp, all drills, as well as the march manœuvres, will be carried out on a war-footing for infantry and field artillery, viz., double companies and 8-horsed batteries.

"During the first period the men will be progressively accustomed to the field equipment. During the second and third periods the units will never go out without a complete field kit. This will include, for camp drills, the valise, havresack, tent, cloak rolled with the mess tin, spade or axe, 2 cartridge pouches containing 30 blank cartridges each. The valise should contain:—1 jumper, 1 shirt, 1 woollen or chammois-leather vest, 1 pair drawers, 2 pairs socks, 1 belt, 1 towel, 1 piece of soap, 1 pair half boots, materials for cleaning and oiling the rifle. The havresack holds the daily ration of bread, salt, tea, sugar, preserved meat (if that is issued) or about  $\frac{1}{4}$  lb. of cooked meat, or else meat to be cooked in the mess tins. For instruction drills the pouch which is worn in front, the reserve pouch, the small water-bottle, and the large boots will not be carried.

"The immediate commanders, before the commencement of the manœuvres, should pay the most minute attention to the fitting of the equipment and to the

bestowal of the proper amount of rations in the havresack, otherwise superfluous matter will be taken, resulting in great fatigue to the man. During the small manoeuvres cooking will be done in the mess tins. Men must never go out fasting.

"I leave to commanders of army corps the fixing of the numbers of the drills with regard to their importance in reference to war; for units which are not under their orders, the programme of their drills will be decided by their commanders. In addition, during the second period, this programme should include for each regiment on a war-footing, at least three day and three night manoeuvres, and two manoeuvres with field firing."

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The Militia, who were called out for a four weeks' training, belonged to the 1895 and 1897 classes; those of the 1895 class completing their second period of instruction, those of the 1897 class their first. But in October, 1897, it was decided, probably for reasons of economy, that only Militia of the 1896 class should do their training in 1898. The dates of their training was fixed by the territorial government functionaries, taking into consideration empty localities and the agricultural interests of the population. These trainings took place chiefly in the spring from April to June, and also in August and September.

The Militia were lodged, in preference, in barracks which had been left free by the departure of the troops for the camps, or else in buildings specially given up by the local authorities for this object. Billetting them on the inhabitants was avoided, and the towns took the trouble to build barracks in default of other accommodation. The cooking was done either in the kitchens of the troops, or else in those put at the disposal of the Militia by the towns. The men had two hot meals a day. By means of economical use of the bread, they were able to give them tea frequently during the week. As a rule the Militia were satisfied with their food, which was well prepared and sufficiently varied.

Their clothing, in consequence of the difference of cut, was not always suitable from an instruction point of view, but with few exceptions it was in accordance with the temperature of the season. The greater portion of it was in the style of costumes worn by the peasants. In some districts they received blue linen blouses with leather belts which carried cartridges, etc. The boots were in a good condition. The head-dress consisted most frequently of a cloth cap, sometimes of a straw hat or a fur cap, and it was always ornamented with the Militia badge. To Militiamen who were too poorly clad, cloaks and boots of the reserve men were given, which had been placed at the disposal of the Military District Commanders.

The health of the Militia was excellent; they were of good physique and had an excellent spirit. Work in the open air had, in particular, an excellent effect on workmen who were accustomed to a sedentary or confined life.

Their instruction was confided to officers and non-commissioned officers taken from the Regular Army, in conjunction with the Militia permanent staff. The general supervision of their drills was under the commanders of the military districts; their duties took up from 6 to 7 hours a day.

As a rule, according to the reports of the commanders of the military districts, the instruction was given in accordance with the syllabus laid down, and gave satisfactory results.—*La France Militaire*.

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SPAIN.—In spite of the concentration of troops necessary for the maintenance of order, the posting to divisions of regiments prescribed for the 1st July had been almost entirely effected by that date. On that date the general stations for the 15



Infantry Divisions and the 4 Cavalry Brigades which have been formed are as follows:—

*1st District—New Castile.*

1st and 2nd Infantry Divisions at Madrid, 3rd Division at Badajoz. A Cavalry Division at Madrid.

*2nd District—Andalusia.*

4th Division at Cadiz, 5th Division at Granada, 1st Cavalry Brigade at Jarez.

*3rd District—Valentia.*

6th Division at Valentia, 7th Division at Cartagena.

*4th District—Cataluna.*

8th Division at Gerona, 9th Division at Tarragona, 2nd Cavalry Brigade at Barcelona.

*5th District—Aragon.*

10th Division at Saragossa.

*6th District—The North.*

11th Division at Pampeluna, 12th Division at Vittoria, 13th Division at Bilbao. 3rd Cavalry Brigade at Burgos.

*7th District—Old Castile.*

14th Division at Leon. 4th Cavalry Brigade at Valladolid.

*8th District—Galicia.*

15th Division at Corunna.

The Cavalry Division at Madrid consists of 4 regiments and a regiment of horse artillery. 15 rifle regiments are included with the infantry.

In the four cavalry brigades are included the lancer, dragoon, and hussar regiments. In all, the 28 cavalry regiments consist of 15 light cavalry (chasseurs), 8 lancer, 3 dragoon, and 2 hussar regiments.

The 108,342 men provided for by this and next year's budget are principally drafted into the infantry.

Since the re-organisation which has followed the peace and the loss of colonies, an infantry division consists of 4 infantry regiments of 2 battalions each in peace, and 3 battalions each in war-time, a rifle battalion, a regiment of light cavalry, a regiment of field artillery, a commissariat and an ambulance section. There are no longer 60 regiments of infantry, but only 56. Two brigades of 6 rifle regiments each have been formed in the place of the disbanded infantry regiments. Three independent rifle battalions form the half brigade for the defence of the entrenched camp near Gibraltar. The 5 supernumerary battalions have been transformed into mountain battalions. In the Pyrenees they occupy Estella, Yaca, and Seo de Urgeb. On the Portugal frontier Caceres is the fourth garrison, the last is at Ronda in Andalusia.—*Le Progrès Militaire.*

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UNITED STATES.—General A. R. Buffington, Chief of the Bureau of Ordnance of the Army, has returned from his trip of inspection to Springfield arsenal and Sandy Hook. At Springfield he looked into the proposed improvements of the Krag-Jorgensen gun and at Sandy Hook he examined the new machine-gun shields. General Buffington paid special attention to the proposed new sight and wind gauge for the small arm, and upon his recommendation it was determined to reduce its weight and size. A description of this sight published by the Ordnance Bureau, says:—The front sight is secured in its slot in the stud by the front sight pin. This pin is tapering, and its small end is driven in from the right and upset on the left to prevent accidental removal. The rear sight is graduated for every 100 yards, from 100 to 2,000 yards, but its construction permits adjustment for any elevation between these limits. The parts of the base

are:—Base screw hole; the ears, in which are the leaf screw holes, and of which the right one is larger and tapped; the base spring seat; the base spring slot, and the sides, the upper surfaces of which are curved to give any elevation from 100 to 2,000 yards inclusive. The opening between the sides forms a seat for the leaf. The base is secured to the barrel by the two base screws which are interchangeable.

The parts of the base spring are:—The bevels, by which the spring is secured in its seat in the base; the point which bears against the front end of the leaf and holds the front lower edge of the slide in contact with the curves on the base and the curve which conforms to the shape of the barrel. The eyepiece has the hole and slot by which it is assembled on the rear end of the leaf; the ears which project into the undercuts in the eyepiece knob and in the head of the eyepiece screw; the sighting notches, the clearance, for each sighting notch, and the wind gauge graduations by which the eyepiece is adjusted to correct for any lateral deviation of the bullet: the vertical line of which metal extending downward from the centre sighting notch, assists the eye in aiming and in holding the gun so the front sight will be vertical. It also distinguishes the centre from the other two sighting notches. The knob of the eyepiece is assembled on the tenon of the eyepiece screw and is secured to it by the knob pin. The eyepiece is moved to the left by turning the knob towards the muzzle and *vice versa*. The eyepiece knob pin is cylindrical and its ends when inserted in its holes in the knob and eyepiece screw should be slightly upset to prevent accidental removal.

The eyepiece screw is assembled in its threaded hole through the rear end of the leaf on which the eyepiece is seated. The latter is held between the eyepiece screw head and knob so that any revolution of the knob and screw will move the eyepiece laterally across the leaf. The ears on the ends of the eyepiece project into the undercuts in the eyepiece screw head and knob, so that any blow received by the screw head or knob will be taken up by the eyepiece, instead of by the eyepiece screw. The parts of the leaf are:—The leaf screw hole; the eyepiece screw hole which is tapped; the eyepiece knob and grooves on which the eyepiece is assembled; the index mark with reference to which the eyepiece is adjusted, and the spring bearing. The top side of the leaf is graduated from 200 to 2,000 yards, inclusive. The graduation marks are the same distance apart, which assists in adjusting the sight for elevations other than for even 100 yards. The adjusting edge of the slide, in adjusting the sight for elevation, should be placed even with the proper graduation mark on the leaf. The distance from the adjusting edge to the rear edge is equal to the space between three graduation marks on the leaf and that from the rear edge to the front edge is equal to three and one-half spaces.

The slide pin when inserted in its hole should be slightly upset on the ends. The screw head of the slide screw should be turned toward the muzzle to clamp the slide and in the opposite direction to release it. The friction between the plunger and leaf caused by the tension of the slide spring assists in adjusting the slide for elevation. Experimental firing and laboratory experiments show that, all other conditions being identical, the muzzle velocity of ammunition loaded with smokeless powder will be increased by exposure to a higher atmospheric temperature, and decreased by a lower. Consequently the elevation for any range will vary slightly with the atmospheric temperature. Moreover, the velocity at 53 feet stamped upon the paper packages may vary, in different issues of ammunition, 15 feet on either side of the standard 2,156 feet per second, which corresponds to a muzzle velocity of 2,200 feet per second in the rifle. The muzzle velocity obtained in different rifles also varies with the same ammunition.

In adjusting the sight for elevation at any range it must be borne in mind that, in addition to the allowance made for variations in the muzzle velocity of the ammunition, allowance must also be made for the effect of differences in light, the amount of front sight seen, the effect of mirage on the target, the effect of heat

developed in firing, the personal equation of the firer, the peculiarities of individual guns, etc. Any lateral deflection of the bullet during its flight can be compensated for by moving the eyepiece to the right or left. As any elevation between 100 and 2,000 yards can be obtained, and as the lateral movement of the eyepiece provides ample correction for any deviation of the bullet, the sight can be so adjusted as to enable the firer to hit the point aimed at. The middle sighting notch is to the right of the axis of the bore, when the centre graduation mark on the eyepiece is opposite the index mark on the leaf, and this displacement corrects very accurately for the average amount which the rifle shoots to the left when fired in a dead calm from 100 to 1,000 yards and at the greater ranges reduces the amount of correction to be made by the firer. The middle sighting notch should be habitually used. The two eccentric sighting notches, which are 0.3 on either side of the middle notch, are intended to enable the sight to fulfil any conditions liable to arise in service, such as its use by sharpshooters when special firing at long ranges is required in a high wind.

The vertical white line on the rear surface of the eyepiece enables a quicker and more accurate aim to be taken and prevents confusion of the three sighting notches. It also assists the eye in leveling the sight while aiming and in seeing the same amount of front sight. The graduation marks for the lateral adjustment of the eyepiece are 0.025 part, and as there are eight divisions on each side of the zero line the middle notch can be moved 0.2 in either direction. The model 1898 sight is graduated for ammunition that has a muzzle velocity of 2,200 feet per second in the rifle; the angles of elevation found by experimental firing and the height of the top edge of the eyepiece, in which the sighting notches are cut, above the axis of the bore are given in a table.

To adjust the sight for elevation, hold the gun in the left hand under the sight; raise the leaf with the right hand and insert the left thumb between the base and leaf; release the slide by turning the slide screw towards the rear; with the right hand move the slide until the bevel edge is opposite the required graduation mark or point on the left; turn the slide screw forward firmly clamping the slide to the leaf; then remove the left thumb and let the slide rest upon the curves of the base. It must be borne in mind that unless the slide screw is turned forward until the screw bears firmly against the leaf, the recoil will cause the slide to slip and change the elevation. In decreasing the elevation a light pressure on the front edge of the slide, after the slide screw is released, will easily move the slide down the curves of the base. The distance from the rear edge of the slide to the adjusting edge is equal to the distance between three graduation marks on the left, and by comparison of the space between the rear edge of the slide and the nearest graduation mark on the leaf with the corresponding space in front of the adjusting edge, the setting of the slide for fractions of 100 yards will be simplified. The distance between the adjusting and the front edges of the slide is such that when the front edge is placed even with a graduation mark on the leaf the elevation will be 50 yards less. It will be observed that the slide screw is on the right side of the sight, and consequently should be operated with the right hand; whereas the eyepiece knob is on the left side, and its manipulations should be done with the left hand. The sighting notches are in that part of the sight nearest the eye, and as far as possible the parts are shaped to prevent the reflection of light into the eye while aiming.

The Ordnance Department of the Army has just received from the Driggs Seabury Gun and Ammunition Company 20 of the new pattern six-pounder guns designed for use behind parapets or in the field. An order for 60 of these guns was given the Driggs Company some time ago, and 20 of them were to be delivered to the Sandy Hook Proving Ground. While this gun has somewhat of the same appearance as the original Driggs-Schroeder gun, it is a distinct improvement on the older gun. Its improvement consists of a decrease

in the number of parts, simplicity of construction and the total absence of all screws, so that the mechanism can be assembled or disassembled without the use of any special tools. The extraction of the empty cartridge case is a unique feature, being more powerful and quicker than any of the guns of this calibre. The piece is mounted on what is known as a minimum recoil carriage also designed by the Driggs Gun Company. The general appearance of this carriage is not unlike the ordinary service carriage used in the Army, but has the addition of a recoil cylinder by which the gun is permitted to recoil independent of the trail. It is also mounted higher than the 3.2-inch field guns of the Army, so that it may be utilised above a parapet. On either side of the trail is a tread for the gun pointer and a shoulder bar similar in shape to that used on the Navy mount, so, to all intents and purposes, the gun operates the same as if mounted in a fixed position while it can readily be disconnected from the bolts of the parapet, and used in any other part of the fortification or in the field or along the beach in the same manner as any ordinary field gun.

The Ordnance Department of the Army has begun an exhaustive investigation of high explosives with a view to adopting one of the many inventions in this line. A Board of Ordnance officers now at Sandy Hook is making experiments, and testing samples of certain high explosives. The officers at Sandy Hook have several inventions under consideration. They are : jovite, wet guncotton, thorite, and emmensite.

Of these explosives very little is known of either jovite or thorite. Professor Monroe, of the Columbia University in Washington, an expert in explosives, is one of those interested in jovite. Dr. Tuttle, of San Francisco, is said to be the inventor of thorite. The object of the Bureau of Ordnance in conducting these tests is to secure a high explosive which shall combine safety with greatness of power. These explosives are to be used generally in the guns of the Army, but principally for use by the large guns and mortars at the coast fortifications.

The Ordnance Bureaus of the Army and the Navy have secured considerable information regarding emmensite. This explosive is similar to the French invention known as mélinite, which has an explosive power twice that of guncotton and ten times that of gunpowder. Mélinite differs from nearly all other explosives in being a picric acid compound. It is the invention of M. Turpin, who several years ago was arrested in Paris and charged with selling the secret of his invention to the Armstrongs, the English gunmakers. France had given large orders for mélinite, and when the Armstrong Company secured the secret of its composition, Turpin, the inventor, charged that an officer of the French Territorial Army and agent for the Armstrong gunworks, had stolen his secret and sold it to the Armstrongs. At that time M. de Freycinet, the Minister of War of France, stated that every nation had explosive materials more or less representing mélinite, but the essential thing was the shell, a very complicated apparatus with all the delicacy of watchwork. The French officer was exonerated, as it was claimed by England that they had purchased the invention from Turpin.

Mélinite, when prepared as an explosive, resembles small crystals similar to those of chloride of potash, only a little finer and of a handsome yellow colour. It is not liable to explosion by shock, and if fire is applied to it it will only burn slowly when in the open air. But in its compressed form its power is most remarkable.

Wet guncotton is the simplest explosive of them all, it being well known that guncotton when wet can hardly be exploded at all, but when dry is equal to dynamite in force.

The objection to guncotton is that it must be kept continually wet to prevent its becoming a most dangerous explosive. Shells charged with guncotton and stored on naval vessels are frequently weighed to see that they have lost no weight



by the evaporation of the water in the guncotton. Should the cotton become dry, there is the greatest danger of a premature explosion that results in the explosion of all the shells with which it came in contact.

The investigations at Sandy Hook up to the present time lead the officers of the Army to believe that either thorite, emmensite, or jovite will be the best explosive to be adopted by the Army. With the use of any of these explosives neither fort nor ironclad will be proof against the force of the shell with which it is charged: an ordinary siege projectile charged with any one of these explosives will spread destruction over 40 cubic metres.

Thorite belongs to the ammonia-nitrate explosives, and while it has given excellent results in the experiments made, the Ordnance Department is not yet convinced of its safety. Regarding the report that Captain Crozier has been instructed to procure samples of Liddite, we learn that the Ordnance Board at Sandy Hook are possessed of the formula for Liddite, and there has been sufficient investigation of that explosive to give the Department a general knowledge of its character.

President McKinley has decided that the American army in the Philippines shall consist of 30,000 troops, exclusive of all troops necessary for the garrisoning of the towns and the policing of the principal cities. This decision was reached at a conference held recently between the President, Secretary Alger, and Adjutant-General Corbin, and is based on General Otis's despatch to the War Department saying that he regarded 30,000 effective fighting-men as sufficient to subdue the insurrection. To give 30,000 men the field will require a total of 40,000 to provide for police and garrison details and allow for those on the sick list. This surplus, which may be called the "factor of safety," is quite small enough, and could well be made larger. General King thinks that 50,000 to 60,000 men are needed. The force under the command of General Otis may be increased beyond 40,000. It is determined that in any case he should have enough to be able to take the field at any time. "Briefly," said Secretary Alger, "General Otis is to have at all times at his disposal a fighting force of 30,000 men, independent of whatever other organisations may be on hand for police duty."

To raise the additional number of troops above the 30,000, orders have been issued by the War Department directing the enlistment of soldiers for volunteer service in the Philippines. Recruiting for the Volunteer Army will be continued until the War Department is satisfied that it has a sufficient number of troops to fill all requirements independent of the 30,000 fighting force. The number of volunteers to be enlisted will probably be about 10,000. Returns received from recruiting officers throughout the country by the Adjutant-General indicate that the enlisted strength of the Regular Army is up to the limit of 65,000 prescribed by law, and the enlistment of volunteers for the new regiments will begin immediately. Half-a-dozen officers have been assigned to some of the larger recruiting stations, and officers will be sent out from the main recruiting offices to establish branch stations in country towns. General service men will be detailed to distribute posters calling for recruits, and to assist in securing enlistments in other ways. In some towns and villages general service men will ride about the streets on bicycles carrying attractive posters calling for recruits. It is probable that in the enlistment for volunteers the rigid examination prescribed for the enlistment of regulars will be followed. The question of officers for the new volunteer regiments has not yet been definitely determined. General Otis was promised authority to select officers for the regiments to be organised in the Philippines, and some of the War Department officials are in favour of authorising him to select the officers of the entire seven regiments from among soldiers now in the Philippines. This would offer a reward for meritorious service and secure officers who have been under fire, who are familiar with the territory where fighting is going on and the tactics of the Filipinos, and would encourage many of the enlisted men of the State troops now in the Philippines to re-enlist in the

hope of securing commissions. Others favour appointing officers in this country, and there is reason to believe that this plan will be adopted. Those who support it say that there are many men who served in the volunteer service in the Spanish-American War who would make excellent officers of the new volunteer commands, and that regiments mustered in at home should have officers to superintend their organisation.

Preparations are under way by the Quartermaster's Department for the chartering of more transports so as to hurry the reinforcements to General Otis as rapidly as possible. Following a consultation at the White House between President McKinley and Colonel Bird, A.Q.M.-General, a telegram was sent to Major Long, Superintendent in San Francisco of the Army Transport Service, instructing him to ascertain immediately what transports are available for charter and how soon they can be obtained. He was also asked to report on their capacity and how soon they can be fitted up for transporting troops. A reply was received from Major Long in which he stated that he would at once begin enquiries regarding available vessels. Q.M.-General Luddington says that the Department is doing everything possible to secure additional transports, and will charter any suitable vessels so as to have them ready for service when the reinforcements are on hand at San Francisco to go to Manila.

There are now under charter 14 vessels on the Pacific coast fitted up for carrying troops; they are the "Grant," "Hancock," "Indiana," "Morgan City," "Newport," "Ohio," "Pennsylvania," "Senator," "Sheridan," "Sherman," "Zealandia," "Warren," "Valencia," and "City of Para." Of these there are but two now at San Francisco, the "City of Para" and "Pennsylvania." The "Valencia" has sailed for Manila and the "Pennsylvania" will probably follow.—*U.S. Army and Navy Journal*.

## NAVAL AND MILITARY CALENDAR.

JULY, 1899.

- 1st (Sat.) H.M. the Queen reviewed the Hon. Artillery Company at Windsor.  
 " " Captain Dreyfus was landed at Quiberon from the "Sfax," and was conveyed to the Military Prison at Rennes.
- 2nd (S.) H.M.S. "Hawke" and "Scylla" arrived at Plymouth from Mediterranean.
- 4th (T.) H.M.S. "Edgar" arrived at Plymouth from Mediterranean.  
 " " Launch of submarine boat "Morse" at Cherbourg.
- 6th (Th.) H.M.S. "Magpie" arrived at Plymouth from West Coast of Africa.  
 " " Launch of battle-ship "Marechal Floriano" from La Seyne, Toulon, for Brazilian Government.
- 7th (F.) 2nd Bn. Royal West Kent Regiment returned to Chatham from their march through the County of Kent.  
 " " H.M.S. "Lizard" commissioned at Devonport for Australian station.
- 8th (Sat.) The Prince of Wales reviewed the Metropolitan Volunteers on the Horse Guards' Parade.  
 " " The 22nd and 41st Companies A.S.C. embarked at Southampton on the "Gourkha," the former for conveyance to Natal, the latter to the Cape.  
 " " Launch of first-class armoured cruiser "Yakumo" at the Vulcan Yard, Stettin, and of torpedo-boat destroyer "Suzanami" from Yarrow's Yard at Poplar, for Japanese Government.
- 10th (M.) The Grand Duke George, Czarevitch of Russia, died in the Caucasus.
- 13th (Th.) The 23rd Company R.E. arrived at Natal on the "Gaul."
- 14th (F.) A Grand Review of French troops took place at Longchamps.
- 15th (Sat.) H.M. the Queen presented a State Colour to the Scots Guards at Windsor.

- 15th (Sat.) The 7th Field and the 8th Railway Companies R.E. left the United Kingdom for the Cape on the "Braemar Castle."
- " " Launch of third-class cruiser "Niobe" from the Actien-Gesellschaft, Weser, for the German Navy.
- 13th (T.) Fighting was renewed in Samoa. British and German troops were landed.
- 21st (F.) Accident to machinery on board H.M. destroyer "Bullfinch," 11 killed and 2 injured.
- " " H.M.S. "Lizard" sailed from Plymouth for Australia.
- " " H.M.S. "Camperdown" arrived at Portsmouth from Mediterranean.
- 22nd (Sat.) Boiler explosion on board Austro-Hungarian torpedo-boat "Adler," off Torcola Island, Dalmatia, 5 killed and 2 wounded.
- 24th (M.) The Waziris attacked a convoy on the Indian Frontier.
- 25th (T.) Launch of first-class battle-ship "Suffren" at Brest.
- 30th (S.) The 41st Company A.S.C. arrived at the Cape from England on the "Gourkha."

*Addendum to June Calendar.*

- 29th (Th.) Launch of first-class armoured cruiser "Garibaldi" from the Ansaldo Yard, Sestri Ponente, for Italian Navy.

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*Le Yacht*. Paris: 1st July, 1899.—"The Progressive Diminution in the Numbers of Merchant Seamen in England." "Yachting Notes." "Transformation of the Promenade Deck of Passenger Steamers into Life-Rafts." 8th July.—"Dupuy de Lôme." "Nautical Terminology." "The Merchant Navy, Home and Foreign." "The Monotypes of the Dinard Yacht Club Model." "Yachting Notes." 15th July.—"The Boilers of Torpedo-Boats." "Yachting Notes." "The American Champion for the America Cup." "Rear-Admiral Caillard, Chief of the Staff of the Navy." 22nd July.—"The Composition of our Squadrons in 1890." "Yachting Notes." "The Exhibition of 1900." "The Mercantile Marine, Home and Foreign." "The Japanese Destroyer 'Akebono.'" 29th July.—"The Decree of the 18th July Regulating the Duties of the Chief of the Staff of the Navy." "Yachting Notes." "Refloating of the 'Paris.'" "Nautical Terminology."

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*La Marine Française.* Paris: 15th May, 1899.—"Naval Portraits: M. Chate-lain, Inspector-General of the Administrative Services of the Navy." "An Essay on Naval Geography." "The Blowing up of the 'Maine.'" "A Study on the Revictualling and Repairs of a Fleet in the Military Ports." "France in Africa" (*continued*).

15th June.—"An Essay in Naval Geography" (*continued*). "The Organisation of the Land Troops detailed for Coast Defence." "The Landing at Baiquiri." "The Question of Naval Boilers in England." "France in Africa" (*continued*).

15th July.—"Lessons from Facts: The Battle between the 'Meteor' and 'Bouvet' in 1875." "The Armoured Cruiser of the 'Jeanne d'Arc' Type." "An Essay in Military Psychology." "The 'Condé' and the 'Gloire,' Armoured Cruisers." "The Rôle of Torpedoes at Santiago." "Official Report on the Boilers of the 'Orlando.'" 

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AUSTRIA-HUNGARY.—*Militär-Zeitung.* Vienna: 3rd July, 1899.—"Ship-building." "The Army Fencing School." 11th July.—"Changes in Uniform." "The Bay of San Mun and its Hinterland." 19th July.—"Workmen Companies." "The Improvement of the Austrian Landwehr." "The Russian Summer Manœuvres of 1899." 27th July.—"Our Navy in 1866." "Boiler Explosion on a Torpedo-boat." "The Re-organisation of the Greek Army."



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ITALY.—*Rivista di Artiglieria e Genio.* Rome: July, 1899.—Has not yet been received.

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RUSSIA.—*Voënnnyi Sbornik.* May, 1899.—"Trial in the Calling of Reservists to the Colours, and the Supply of Horses, carried out by the population in conjunction with the Mobilisation of an Infantry Regiment." "War." "The Question of Officers in the Seventeenth Century." "Remarks on 'Regulations for Infantry Drill.'" "The Horse in the Expenditure of a Cavalry Officer." "The Shooting of Garrison Artillery." "The Tactical Preparation of Field Artillery." "The Commissariat Officers of an Army Corps." "Military Cycling." "The Instruction of Non-Commissioned Officers." "The Society for Mutual Help." "The Organisation for the Provisioning of the Troops in the Assembly at Daghestan in 1898." "Sketch of the Risings in the North-West Frontier of India in 1897." "New Regulations for Musketry Instruction." "Notes on the German, Austrian, and French Corps of Officers."

June, 1899.—"Mobilisation Trial in the Yourev District." "Pictures of Suvaroff." "War" (*continued*). "The Question of Officers in the Seventeenth Century" (*concluded*). "Personal and Compulsory Service in Finland from 1882 to 1891." "Reduced Shooting Apparatus with Disappearing Targets." "Note on our Cadet Corps." "The Commissariat Officers of an Army Corps" (*concluded*). "Military Cycling" (*concluded*). "Description of the Pamir." "Provisional Regulations for the Calling-out of the Reserves and Volunteers of the First Class." "Actual Situation of the Armed Forces of Japan."

July, 1899.—"The Origin of the Préobrajensky Regiment." "War" (*continued*). "The Strength of the Military Organisation of Troops." "Tactical Work of Officers." "The Infantry Field Regulations," and "Instructions on the Battle Formation of Infantry" (*concluded*). "Two Years of the Application of the Cavalry Regulation" (1896 edition). "Sketch on Field Artillery Tactics according to Foreign Regulations." "Field Service Instruction of Pioneers." "Description of the Pamir." "The English in the Soudan and the Abyssinian Question."

SPAIN.—*Memorial de Ingenieros del Ejército.* Madrid: July, 1899.—"The Bay of Algeciras" (*continued*). "Public Works in Spain and Military Engineers, by Señor Alzola." "Training of the Troops of Sappers and Miners" (*concluded*).

*Revista Técnica de Infantería y Caballería.* Madrid: 1st July, 1899.—"Military Life in the XVI. Century: The Death of Don Juan." "The District Schools of the Country." "The Evening before Jena." "Field Works and Entrenching Tools for Infantry." "Forms of Discipline." 15th July.—"Pay and Promotion" (*continued*). "Military Life in the XVI. Century: Death of Don Juan" (*concluded*). "Military and Political Responsibilities: The Loss of the Colonies." "Some Notable Marches." "Field Works and Entrenching Tools for Infantry" (*continued*).

SWITZERLAND.—*Revue Militaire Suisse.* Lausanne: July, 1899.—"On the Criticism of Manœuvres." "The Actual Situation of the Recruiting of Infantry Officers." "Artillery." "Modern War and the German Cavalry."

## NOTICES OF BOOKS.

### *Wonham's System of Signalling.*

This little book is carefully compiled, and its author has evidently spent much time and trouble in making out his system; but he appears to be too sanguine if, with the present arrangement of elements he has allotted to the numerals, he considers he has attained (as he states in the preface) "a way of arriving at the present standard of efficiency by a different and far easier road." If he takes the accuracy and rate of signalling now accomplished by the Army as that standard, it could never be arrived at by his method in its present shape, the reason being the similitude of the signs employed for certain numbers. In his desire to save the intelligence he has thrown the lion's share of the work on the ear or eye. Of the ten numeral signs employed, two pairs, *i.e.*, 3 and 4, 8 and 9, require the greatest discrimination to distinguish the one from the other, no matter on what instrument they are sent.

It will be seen by the Annual Report on Signalling issued by the War Office that the short numerals have been found successful with the exception of 3 and 7, *i.e.*, the former figure is too like the 2 and 4; and the 7 like the 6 and 8. Errors were evidently found to occur even though collations were employed; in the system under consideration no collation appears to be used. The underlying idea of producing the many combinations of elements of the Morse alphabet by the repetition of a few is admirable, but some way must be found of minimising the defect of non-collation, or inaccuracy must result.

From practice and experience we have learnt the following facts:—1st, that the eye or ear is more liable to drop a dot than to add one, *i.e.*, to read three dots when four are sent, rather than four dots when three are signalled, etc; 2nd, that less mistakes are made in letters commencing with dots than with dashes, *i.e.*, that a less percentage of mistakes occur in D's and B's than in U's and V's; 3rd, that some men have a tendency to read opposites, *i.e.*, an A for an N, etc. The latter fault arises, not from want of perception of ear or eye, but from want of practice or muddle-headedness; and in the composition of a code, if all desiderata cannot be satisfied, the consideration of No. 3 must go to the wall. Besides mistakes in reading there are the errors that result from splitting or running a letter, *i.e.*, reading an I for two E's, or *vice versa*. In the alphabet on page 27 some letters of the alphabet are represented by two figures and some by one. A safer method would appear to be to express every letter by two figures; the danger of splitting or running letters, and consequently reading two letters where one was intended, would be avoided, as the signaller would know he must get a certain number of letters in each group. By this method the unit length of the alphabet is increased, but very much greater accuracy is insured. Employing the numerals now in use in the Army, the following alphabet should give a very accurate result, even without collation:—E 55, A 05, O 50, I 85, T 58, D 25, H 52, N 00, R 08, S 80, U 02, Y 20, C 82, F 28, G 22, L 88, M 75, W 57, B 35, K 53, P 70, V 97, Q 30, X 03, J 87, Z 78. This alphabet, though each letter averages, when figured, 15 units, as against 8 if the letters were sent themselves, has the advantage that only six numerals are employed, and that it combats generally the sources of error mentioned above. The long numerals would be used to express 3 and 7.



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**STAFF COLLEGE, AUGUST, 1898.**

The following Officers were successful—

Captain A. W. Pack-Beresford .....	Royal Artillery.
Captain H. F. Gaynor.....	Royal Engineers.
Captain H. Bruce Williams .....	Royal Engineers.
Hon. G. A. A. Hood .....	Grenadier Guards.
H. A. Levenson, Esq. ....	Royal Inniskilling Fusiliers.
Captain K. M. Davie .....	Gloucestershire Regiment.
Captain S. Jervis .....	South Staffordshire Regiment.
C. F. Romer, Esq. ....	Royal Dublin Fusiliers.
*Brevet-Major A. J. Godley.. ..	Royal Dublin Fusiliers.

\* Specially nominated for admission to the Staff College.

The undermentioned Officers also qualified but there were no vacancies for them—

A. Symons, Esq. ....	13th Hussars.
Captain D. Arbuthnot .....	Royal Artillery.
*Captain J. A. S. Tulloch .....	Royal Engineers.
P. O. Hazelton, Esq. ....	Army Service Corps.

\* Obtained FULL MARKS in one paper in Mathematics.

Places taken by the above Officers in the various subjects include—

**MILITARY HISTORY**—First, Second, Third (two), Sixth, etc.  
**MATHEMATICS**—Second, Sixth, Seventh, Ninth and Tenth.  
**TACTICS**—Third and Fourth.  
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